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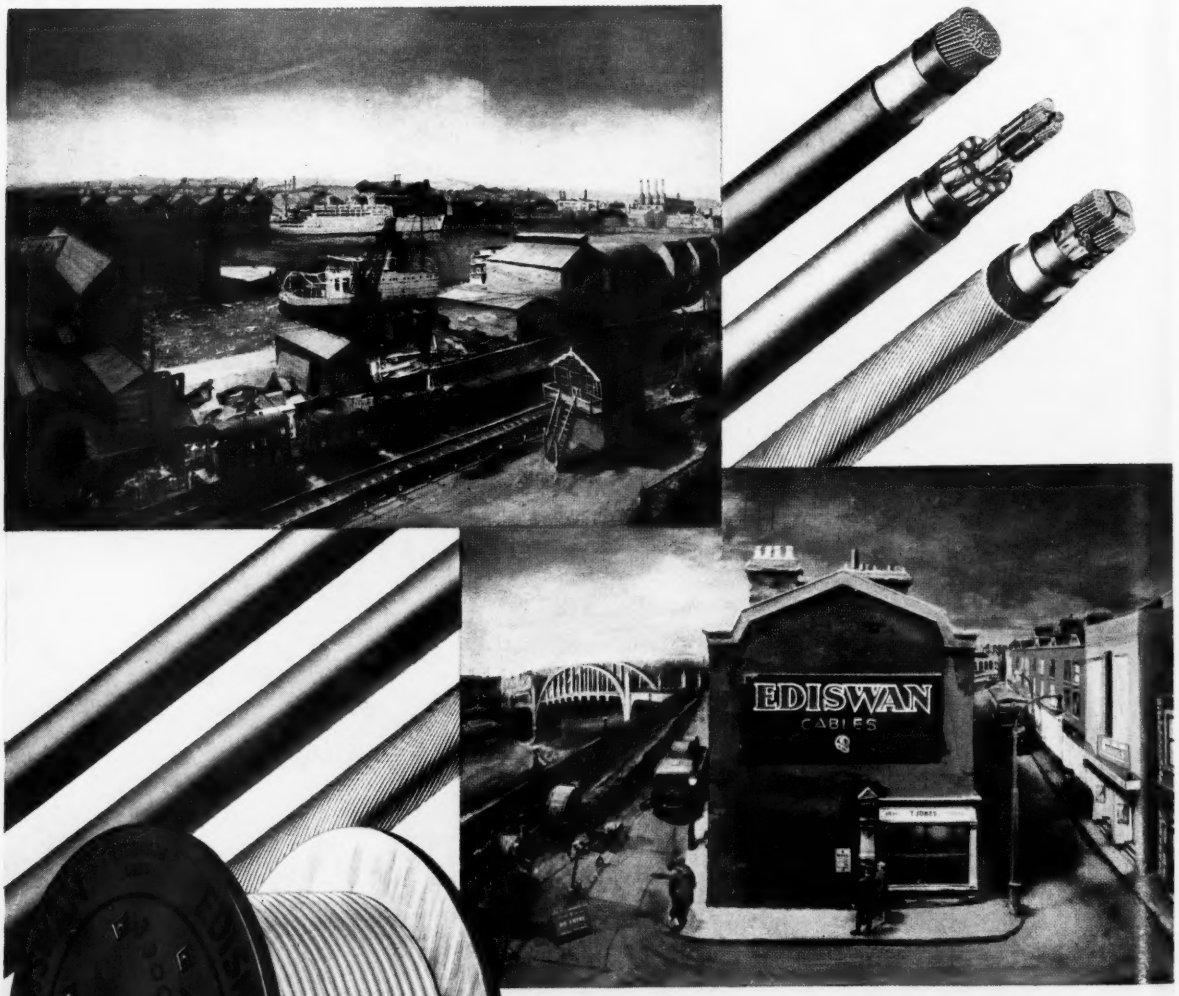

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ELECTRICAL REVIEW

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16 MARCH 1956

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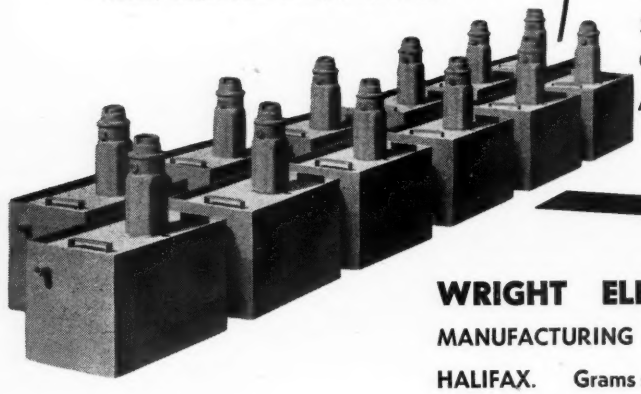

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ELECTRICAL REVIEW

16 March 1956 Vol. 158 No. 11 Established 1872

Railway Electrification Landmark

THE British Transport Commission's announcement on 6th March that the 50 c/s single-phase a.c. system will be used for future electrification on British Railways was made after exhaustive study of the issues involved. To suggest, as has been done, that the decision was belated rather than bold, is to ignore the special conditions on British Railways, described by Sir Brian Robertson, chairman of the British Transport Commission, as in many ways more exacting than those obtaining on any other system in the world. The technical possibilities of the 50 c/s system, particularly with rectifier locomotives such as are to be used in this country, have been demonstrated adequately in France, but it was a formidable problem to decide whether similar performance could be achieved with equal economy by d.c. equipment in British conditions.

A simple statement of the characteristics of 50 c/s traction usually raises the question: why has it not been more generally adopted before? Its advantages were seen at the beginning of the century, and the first single-phase a.c. locomotive in the world operated originally on a 50 c/s supply. The fact that nearly fifty years elapsed before the system was again developed actively, except in isolated cases, is a measure of the difficulties involved. To-day the rectifier is giving an impetus to 50 c/s electrification just as in earlier forms it stimulated the d.c. system some twenty-five years ago. The development of rectifier type traction equipments which will be efficient and easy to maintain has become a priority task for the electrical industry. Some may feel that transformers, extra auxiliary machines and smoothing equipment are a poor exchange for the resistances of d.c. traction, now so roundly assailed by the advocates of the 50 c/s system. Only experience can show how far such misgivings are justified. If electrification did not play so important a part in the British Railways modernisation plan, it would have been possible for that experience to have been gained on minor schemes.

In the circumstances the decision as to which system to adopt had to be made so that the work could proceed without risk of technical development here or abroad imposing a change of policy within a few years. Its vindication will rest largely with the electric traction industry, to which the choice of the 50 c/s system in Britain offers a proving ground which may well open the door to increasing business abroad, particularly in countries where traffic density would not justify the capital cost of a d.c. installation. An article dealing with the Commission's decision is published in this issue.

NUCLEAR POWER PROSPECTS

Sir John Cockcroft, director of the Atomic Energy Research Establishment, Harwell, is reported to have said in an address to the Foreign Press Association recently that there were good prospects of establishing in Great Britain power stations with individual capacities up to 500 MW. This suggests a considerable advance in technique and outlook since the publication of the Government White Paper announcing the ten-year programme for the building of twelve nuclear energy power stations about a year ago (see *Electrical Review*, 18th February, 1955).

The programme at that time visualised a total capacity of up to 2,000 MW, or an average individual capacity of under 200 MW per station. The first four stations which were scheduled to be in operation by 1963 were expected to have a total capacity of 400 to 800 MW, i.e., a likely average of 150 MW, and the last eight stations, to be in operation by 1965, were planned to have a total capacity of upwards of 1,000 MW, or an average individual capacity of well under 200 MW.

The 500 MW figure now mentioned also suggests a considerable advance in the supplies of nuclear energy fuel. Indeed Sir John is reported to have said that the British Commonwealth countries were pulling well together in atomic energy, and that there were good grounds for the Geneva optimism that there would be plenty of uranium for the civil nuclear power programme of the 1960's.

COMPUTERS AND MANPOWER

The electronic digital computer is undoubtedly one of the most potentially useful devices which have so far been developed in this century. This usefulness, however, has still not been fully recognised by many of the industries which could well take advantage of its capabilities. There has also been far too much loose talk about electronic " brains " and the powers of " thinking " which these machines are alleged to possess. The computer is a straightforward mechanism capable of addition, subtraction, multiplication and division, but it can perform these operations with extreme rapidity. In fact, it is so rapid that it can solve in a few minutes problems which would normally take a team of mathematicians several weeks or even months. From this it can be seen that certain problems which are almost impossible to solve by normal methods can be tackled with ease by a computer. Another merit of the computer is in easing the shortage of scientific manpower.

ON LEVEL TERMS

The Herbert Committee favoured the incursion of the Electricity Boards into the retail and electrical contracting fields as being in the best interests of the consumers. It did not consider that the Boards' activities represented such a dire threat to private enterprise as it had been asked to believe. It is still true that even if the agreement between the Boards and the Electrical Contractors' Association is observed there are certain advantages enjoyed by the Boards. One is the possession of showrooms which are regarded primarily as places at which electricity accounts can be paid and therefore chargeable against electricity supply; another is ability to obtain money at favourable rates to finance hire-purchase business. The Committee made suggestions on both these subjects (closer allocation of costs and the possibility of charging " commercial " rates of interest) which would result in competition on more level terms.

POWER FROM THE NILE

Over the centuries the countries of North-East Africa have been entirely dependent for their fertility and prosperity on the irrigation of the lands by the waters of " Mother Nile." Now, more and more, their development is being fostered by vast hydro-electric schemes on the river, as for example the Owen Falls station in Uganda. Ethiopia is also reported to be interested in similar developments in its area.

The ultimate capacity of the Owen Falls plant is 150 MW. This, as a recent announcement by the Uganda Electricity Board shows, is only a small part of the potential resources of the river. In the 19-mile stretch below the Owen Falls scheme alone, according to surveys carried out for the Board by Sir Alexander Gibb and Partners, there is an additional power potential of some 500 MW. This could be developed in two or three stages; present indications are that three dams and power stations could be constructed, the first having a capacity of over 150 MW. The total firm output of this station would be 700-800 million kWh per annum. At present-day price levels the capital cost is estimated to be rather less than that of the Owen Falls station which, when fully developed, will provide power as cheap as any post-war scheme.

The Board states that the start of construction of any new station depends on the growth of the use of electricity in Uganda, on exports to Kenya and also on railway electrification. At present it seems likely that additional power will be required in Uganda by 1964-65. As construction takes about five years, preliminary work may have to start before 1960. A detailed examination of one site is now being made.

POTENTIAL EXPORTS LOST

We recently received a note from a small manufacturer in the North of England concerning a new piece of equipment which he is now making and which is available at the present time. One paragraph of the note read " no export inquiries until 1957." Surely in the national interest some effort to sell its products abroad should be made by any manufacturer, whether small or large? In the case of the firm concerned, the item described was indeed new and of considerable use. It would probably find a ready market overseas.

We have recently read several accounts by responsible people criticising the half-hearted way in which a large number of British manufacturers still concern themselves with exports. It is perhaps to combat this very attitude that many of the recent financial restrictions have been introduced to make selling harder at home and encourage more searching for export markets. If we do not succeed our standard of living will fall: there is no alternative left; and every manufacturer no matter of what size must neglect no opportunity of helping the country in this way.

Railway Modernisation

STANDARD-FREQUENCY ELECTRIFICATION FOR BRITISH RAILWAYS

By B. K. COOPER*

THE decision to adopt the 50 c/s single-phase system of traction at 25 kV for future electrification on British Railways, subject to the approval of the Minister of Transport, was announced by Sir Brian Robertson, chairman of the British Transport Commission, on 7th March. This will affect 1,210 route-miles out of the 1,460 route-miles already scheduled for electrification under the British Railways modernisation plan published last year, and involves both main trunk routes and suburban electrifications, the lines concerned being as follows:—

Main Trunk Routes (820 route-miles). (i) Euston to Birmingham, Crewe, Liverpool and Manchester. (ii) King's Cross to Doncaster, Leeds and (possibly) York. (iii) Liverpool Street to Ipswich, including Clacton, Harwich and Felixstowe branches.

Suburban Electrification (390 route-miles). (i) London, Tilbury and Southend line. (ii) Liverpool Street to Enfield and Chingford. (iii) Liverpool Street to Hertford and Bishop's Stortford. (iv) King's Cross and Moorgate to Hitchin and Letchworth, including the Hertford loop. (v) Glasgow suburban lines.

Of the above, the main trunk route from Liverpool Street to Ipswich and its branches is an extension of the Liverpool Street-Shenfield 1,500 V d.c. section, which is already being extended at that voltage to Chelmsford. This work will be continued at 1,500 V, together with the branch from Shenfield to Southend, in order to bring the benefits of electrified services to those areas at the earliest possible moment, but both sections will be converted eventually to the 50 c/s system.

Priorities of Work

Work will begin at once on a 50 c/s pilot scheme from Crewe to Manchester, the target date for completion being January, 1959. This will probably be followed by electrification from Crewe to Liverpool. Simultaneously work will go forward on the lines from Liverpool Street to Chingford, and from Fenchurch Street to Tilbury and Southend. The dates of conversion of the alternative route to Southend from Liverpool Street, and the Liverpool Street-Chelmsford section, are likely to be governed by the availability of rolling stock equipment for the new system.

At present it is not necessary to convert the 1,500 V d.c. Manchester-Sheffield-Wath lines as these are not affected by extensions under the modernisation plan, and the platforms used by the trains at London Road are separate from those of the Euston-Manchester line. Should later extensions bring the Manchester-Sheffield-Wath scheme into direct operating contact with the London Midland or Eastern Region 50 c/s main-line electrifications the question of conversion would have to be faced.

Similarly, the Manchester South Junction and Altrincham 1,500 V d.c. line does not require conversion because its trains have their own platforms at London Road station. Other lines which are self-contained and therefore will continue with their present third- and fourth-rail low-voltage d.c. systems are Liverpool-Southport, the Wirral and Tyneside lines, and Euston-Watford. At Euston, platform lines equipped for the 50 c/s overhead system could be provided also with conductor rails for the suburban trains. On the other hand, the equipment of the Manchester-Bury third-rail 1,200 V d.c. electrification will have to be renewed shortly, and consideration is being given to its conversion to the 50 c/s system.

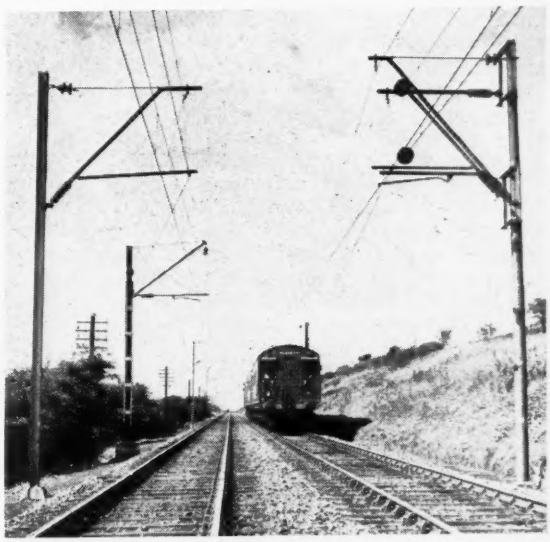
S.R. Third-Rail System to Stay

The Southern Region third-rail 660 V d.c. electrification remains a special case because of its extent, as it did at the time of the 1951 report on "Electrification of Railways." The Eastern Section extensions into Kent under the modernisation plan will be carried out on the existing system and no change will be made in the other lines. Should the West of England line to Exeter be electrified at a later date, this would be at 50 c/s, and consideration might be given to dual-system motive power capable of running on a third-rail d.c. supply through the present electrified area between Pirbright Junction (near Woking) and Waterloo. There is a precedent for this in the U.S.A., where rectifier locomotives and motor coaches are used for inter-running between a high-voltage a.c. main line and a 660 V third-rail section into the Grand Central terminal, New York.

Comparative Study

Before the decision to adopt the 50 c/s system was taken, a special survey was made of the Euston-Birmingham-Manchester-Liverpool route (approximately 495 route-miles, including branches and diversionary lines) for the

A part of the Lancaster-Morecambe-Heysham 6·6 kV a.c. system



* General Electric Co., Ltd.

purpose of comparing a.c. and d.c. electrification. The results of this are shown in Table 1.

Omitting the cost of signalling and depots, which is about the same for either system, the direct cost of a.c. electrification is 93 per cent of that by d.c. A reduction in annual costs of £1 million is estimated in favour of the a.c. scheme.

Details of the survey and the many factors considered in deciding to adopt the 50 c/s system are given in a report, "The System of Electrification for British Railways," to be published shortly by the British Transport Commission. The total expenditure on electrification envisaged under the modernisation plan is £185 million. In respect of all the lines at present proposed for electrification, it is estimated that the material savings from the use of alternating current will include 27,000 tons of copper and 16,000 tons of steel. These will arise from the smaller-section conductor wire and the lighter overhead structures. A comparison of weight of overhead materials required per single-track mile is made in the report and given in Table 2.

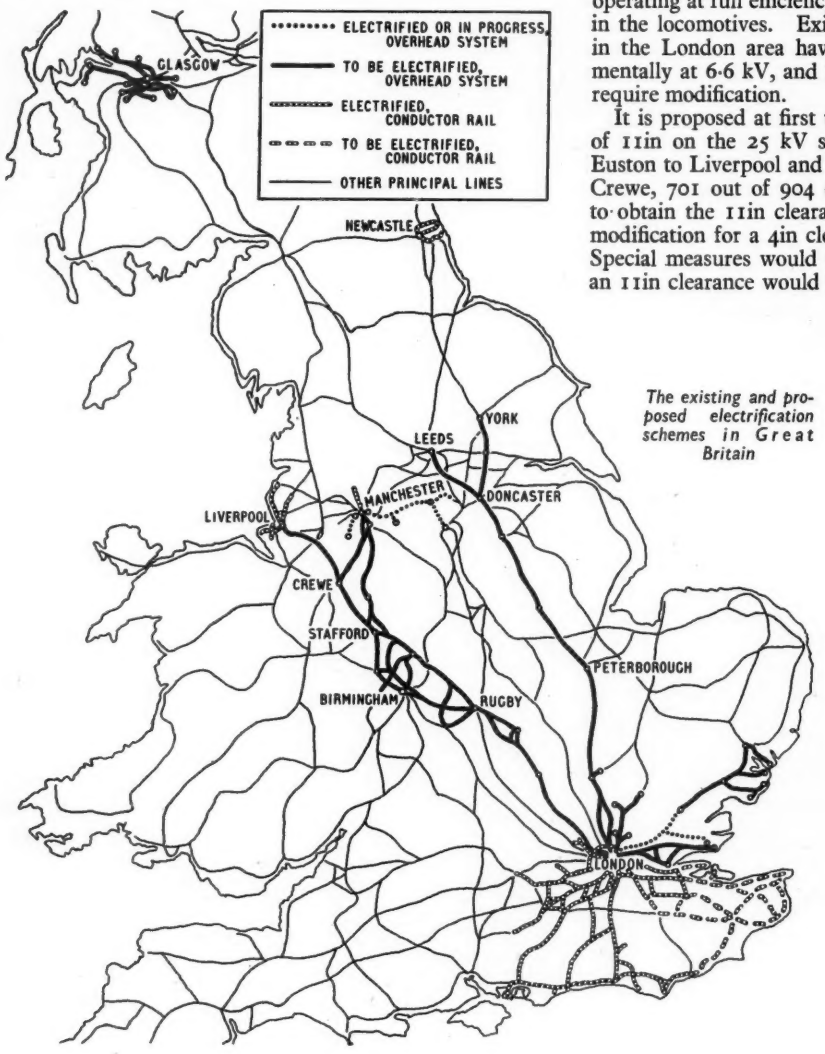
Because of the restricted British loading gauge and the consequent limitation on the clearances that can be provided, without civil engineering work, between line wires, earthed structures and rolling stock, it will be necessary for the voltage in some inner urban areas to be reduced to 6·6 kV. At this voltage it has been assumed that the existing 4in minimum clearance on 1,500 V d.c. lines will be satisfactory. Typical examples of where the lower voltages might be necessary are between Willesden and Euston, or into Liverpool Street, where tunnels and numerous overbridges occur. Automatic provision for operating at full efficiency on either voltage would be made in the locomotives. Existing 1,500 V d.c. overhead lines in the London area have been energised already experimentally at 6·6 kV, and it is established that they will not require modification.

It is proposed at first to use a basic minimum clearance of 11in on the 25 kV system. On the main lines from Euston to Liverpool and Manchester, via Birmingham and Crewe, 701 out of 904 overbridges would require lifting to obtain the 11in clearance, compared with 478 needing modification for a 4in clearance in a 1,500 V d.c. scheme. Special measures would be necessary at 97 bridges where an 11in clearance would be impracticable. The total cost of providing the necessary clearances throughout is estimated to be about £6 million for 1,500 V d.c. and £9 million for 25 kV a.c.

Electrification at 25 kV of the Euston-Liverpool-Manchester lines is estimated to require 12 substations, which would be the property of the Central Electricity Authority and supplied direct from the 132 kV grid. There is already a C.E.A. substation close to each of the proposed supply points and it is estimated that less than 17 miles of feeder cables or overhead lines would be required for interconnections. The C.E.A. has confirmed its agreement with these arrangements. By contrast, the report states that some 70 substations would be required for a 1,500 V d.c. electrification of the same lines, and that the railways would be involved in supplying a 33 kV cable system for about one half of the route.

Table I

Items of Expenditure	25 kV a.c. (£million)	1,500 V d.c. (£million)	Difference in favour of a.c. (£million)
Power supply and overhead system (including cost of providing clearances) ..	29·3	38·6	9·3
Motive power, including electric trains, but excluding hauled stock	48·6	46·3	−2·3
Signalling	25·0	24·5	−0·5
Depots	2·7	2·7	—
Train heating and lighting	6·1	7·1	1·0
Contingencies ..	6·1	4·4	−1·7
TOTAL ..	117·8	123·6	5·8



The existing and proposed electrification schemes in Great Britain

A joint investigation has been made by the railway and the C.E.A. to determine whether harmful effects on the supply system would be caused by the unbalancing effect of a single-phase load, or by harmonic disturbances set up by rectifiers in the locomotives and trains. Further discussions were held with French Railways and Electricité de France. No difficulties have been found in France, and since conditions for the British grid will be more favourable than those on the E.D.F. network, the C.E.A. has been able to assure the British Transport Commission that the way is clear to use a single-phase supply for traction.

The total estimated capital costs of the supply of power from the 132 kV grid to the 25 kV Euston-Liverpool-Manchester scheme is £29·3 million, compared with £38·6 million for a 1,500 V d.c. system. Broad surveys of other lines have led to the conclusion that the advantages of the a.c. system demonstrated by the comparative study will apply in equal or greater measure to all other lines likely to be electrified in Great Britain.

Rectifier Motive Power

With regard to motive power, the report outlines the merits of the rectifier system, using both the mercury-arc rectifier in its present form and in other forms under development, or rectifiers formed of semi-conductor materials. Special reference is made to the bringing into trial service in December last year, on the Lancaster-Morecambe-Heysham 50 c/s line, of a 750 kW germanium rectifier installed in a multiple-unit train, which represented the first application in the world of this type of rectifier to traction service.

Experience with rectifier locomotives in France has resulted in their being rated to haul loads 60 per cent in excess of those permissible with the latest type of d.c. locomotive of the same weight, which is attributed to the improved adhesion obtained when the motors are permanently in parallel. Preliminary inquiries indicate that while the a.c. rectifier locomotive will cost more than an equivalent d.c. design in Great Britain in the immediate future, there is reason to believe that its cost will fall as experience is gained and that it will at least be no dearer than its d.c. counterpart. The difference in the present estimated costs of the alternative fleets of 720 d.c. locomotives or 660 a.c. locomotives required to operate the Euston-Liverpool-Manchester lines is about £2 million in favour of d.c., in a total cost for d.c. locomotives of £36·3 million.

Regenerative braking cannot be applied to the normal rectifier locomotive and if this facility were desired it would be necessary to use rotary conversion equipment in certain locomotives operating on a few sections of line. It is unlikely that the need will arise in the work proposed in the present plan.

Rectifier-fed d.c. motors are also proposed for multiple-unit stock, where in suburban service with frequent stops a considerable saving in energy consumption would accrue from the elimination of resistance losses, together with improved adhesion, permitting higher acceleration by the use of a smaller number of larger motors. Parts of the equipment at present operating in the Lancaster-Morecambe-Heysham trains have been designed to permit their being mounted on the underframe of standard stock. Designs have been prepared for other types of rectifier which can be mounted in this way. At present the difference in cost in favour of d.c. for the 220 three- or four-coach trains required for suburban and inter-city service on the Euston-Manchester-Liverpool lines is estimated at around £400,000 in a total cost of about £10 million for d.c. equipment.

At the present time the use of 50 c/s a.c. motors is not contemplated either in locomotives or multiple-unit stock. It may be noted, however, that reductions in size and weight are being achieved on the Continent, and that self-ventilated, axle-hung machines are now being built for motor coaches. Hitherto, the tendency has been for the 50 c/s motor to be forced-ventilated, which is inconvenient in motor coach stock, and arranged to drive through a flexible transmission to give the protection against mechanical shocks considered necessary because of its relatively complicated construction.

Table 2

	Weight of materials required per single-track mile		
	25 kV a.c., tons	1,500 V d.c., tons	A.c. as proportion of d.c., per cent
Weight of copper for equivalent conductivity	2·9	9·0	32
Weight of steel (average for a section of the railway)	20·0	24·0	83

A locomotive on the Lille-Basle section of the 25 kV a.c. system of French Railways, using ignitron mercury-arc rectifiers

Industry's Part and Prospects

When the announcement of the decision to adopt 50 c/s traction was made, it was stated that the electrical industry would be called upon to supply the motive power equipments for the trains, as well as to continue the manufacture of diesel-electric power equipments for service on lines not included in the electrification programme. Emphasis was placed on the opportunity that would thus be given to British manufacturers to enter the export market with 50 c/s traction equipment. By concentrating on the development of rectifier locomotives with d.c. motors, the plan enables British industry to take full advantage of its established reputation and long experience in d.c. traction. A statement from the Electric Traction Section of B.E.A.M.A. has already welcomed the decision and pledged the full backing of the industry's technical services and manufacturing facilities. Close contact had been maintained between the railways and the industry in planning the schemes now proposed.

The British Railways electrification statement was accompanied by an announcement that the vacuum brake has been selected as the type of power brake to be fitted to freight rolling stock under the modernisation plan. The building-up of a fully braked fleet of wagons will be essential for taking full advantage of the capacity of electric motive power for accelerating the movement of all classes of traffic.

Thermal Resistivity of Soil

THE discussion on the I.E.E. paper entitled "An Evaluation of Two Rapid Methods of Assessing the Thermal Resistivity of Soil," reported in the *Electrical Review* of 9th March was opened by Mr. W. H. Lythgoe (W. T. Henley's Telegraph Works Co.). He emphasised that the high cost of copper had in recent years necessitated its more economic use, since low soil thermal resistivity increased permissible current loading.

Mr. C. C. Barnes (C.E.A.) pointed out that measurements had no virtue in themselves but the utilisation of the measurements was of real importance. Any means of increasing the permissible current rating of buried cables would result in a large financial saving and a greater utilisation of the cable materials.

Mr. F. R. Axworthy said that if the needles were made a little thicker and perhaps a little longer they might not be quite so accurate but they would be more robust. For an accuracy of 15 per cent instead of 10 per cent, one could produce needles having a better chance of a reasonable life. With thicker needles the resistance could be wound on the outside of the needle instead of on the inside.

Dr. E. Griffiths suggested that the authors' work should be continued and that more use should be made of laboratory tests. The results obtained should be correlated and the basic effects of moisture and density factors considered.

L.E.B. Experience

Mr. F. C. Hole stated that the experience of the London Electricity Board showed the advisability of getting, if possible, check points over the whole of the likely range in the value of G from, say, 40 up to 300. Difficulties in making up the probes had been overcome largely by: (1) the use of a suitable synthetic resin cement for fixing the thermocouple hot junctions in the wall of the probe; (2) the adoption of doped glass fibre insulation for the thermocouple and heater wires; and (3) a spring-loaded arrangement for taking up expansion in the heater wire.

Dr. K. Konstantinowsky pointed out that permissible continuous loading of a cable buried in the ground was controlled by the so-called internal thermal resistance of the cable and by external factors. The sampling method was applicable with a certain amount of safety only to certain soils. He would like the authors to explain what they considered to be the moisture runaway.

Dr. F. Busemann was somewhat sceptical about the economic soundness of heating cables on every day of their working life up to their permissible temperature. One was now expected to know not only about the thermal resistivity of the soil but also its so-called diffusivity. The needles referred to appeared to be made of materials like brass and duralumin which had a fairly high conductivity. He suggested that a steel needle would be shorter and more robust.

Mr. H. N. Cox (British Insulated Callender's Cables, Ltd.) said that the paper made no appreciable reference to the determination of thermal resistivity in soil in the immediate neighbourhood of existing cables. It was very helpful to a cable engineer to have some really precise knowledge regarding thermal resistivity. On a congested route it was probably good practice to put as much as possible through the cables but where there was only one cable one had to keep an open mind about the economics of the matter and give consideration to the cost of power losses.

Mr. L. Gosland (E.R.A.) observed that the paper should not be regarded as final but the work should be continued. Neither of the methods discussed was capable of application to very stony and rocky soils.

Mr. A. H. Bennett said that as many people as possible should carry out tests. The Electricity Authority should make use of the tests described in the paper and let the E.R.A. have information in the form which had been prepared. One could worry too much about the overloading of cables.

Mr. K. Mochlinski, replying to the discussion, stressed that thermal resistivity depended on density of the ground, the amount of moisture and whether the structure was sand, clay or chalk. Measurements *in situ* were most successful. The sphere method, properly utilised, gave very good answers. If the size of the needle was increased, the time of the measurement also had to be increased. They should aim at having a more robust needle. Stainless steel might be an improvement on the brass now used. Larger needles, however, needed more power, and, owing to the longer time involved, increased errors.

New Harwell Outstation

TWO built-up areas on Grove Airfield, near Wantage, are being acquired by the Atomic Energy Authority as a site for a small outstation of the Atomic Energy Research Establishment, Harwell. These two areas are part of the airfield which the Air Ministry had decided to relinquish.

The new outstation is mainly to provide laboratories to allow the Technological Irradiation Group to develop more rapidly. This group, a part of the Harwell Isotope Division, was formed in June, 1955, in order to assist industry in making full use of the large amounts of radioactive material which will become available from the expanding atomic energy programme. The additional laboratories at Grove are seven miles from Harwell and less than two miles from Wantage.

In the choice of the new outstation preference was given to sites which had existing buildings so that the work of the new group could be advanced as rapidly as possible. The location of the Technological Irradiation Group at Grove, rather than inside the Harwell perimeter, will reduce the formalities for those who wish to use the irradiation facilities, and so make it easier for industry to co-operate to the full. No radioactive waste will be discharged, as any small quantities of waste which may arise in the laboratories will be transferred to the main plant at Harwell for treatment and disposal. A similar system has been used by the Radiochemical Centre at Amersham, and has proved to be satisfactory in practice. Later it is proposed to transfer the Isotope School from Harwell to the new site on Grove Airfield.

Nuclear Physics Course

A short course of six lectures as an introduction to nuclear physics for engineers, by Mr. W. P. Jolly, B.Sc.(Hons.), is to be held at the South-East London Technical College, Lewisham Way, London, S.E.4. The lectures will start at 6.45 p.m. on the following days: 2nd, 3rd, 7th, 9th, 14th and 16th May. The main subjects in the syllabus are: structure of nucleus, natural radioactivity, radioactive decay, detection of radiation, physical and physiological effects of α, β, γ and neutron irradiation, nuclear reactors, artificial radioactivity, tracer technique, fission, fusion, chain reaction, nuclear bomb, hypothetical fast and thermal reactors, breeding, reactor size, propulsion reactors, operation of practical slow and fast reactors, disposal of fission products, economics of power production and balanced reactor programme.

Applications for the course should be made to the Head of the Electrical Engineering Department, Mr. C. W. Robson, B.Sc.(Eng.), M.I.E.E., together with the fee of 10s.

Recruitment to Engineering

Discussion on Report of Advisory Council on Scientific Policy

AT a meeting of the Institution of Electrical Engineers in London on 1st March recruitment to the engineering profession was discussed with particular reference to the report of the Advisory Council on Scientific Policy published last year (*Electrical Review*, 2nd December).

Sir Solly Zuckerman (chairman of the Committee on Scientific Manpower), who opened the discussion, emphasised that the report really originated from certain fears that had been expressed that the expansion of the universities had not been entirely in the interests of British industry. These fears were not justified, and there was no doubt that the country would be jeopardised if the flow of scientists and engineers from both universities and technical colleges did not continue to increase. Particular stress was laid throughout the report on quality, without which success could not be achieved. He said the Committee on Scientific Manpower would welcome any assistance on what the engineering industries would require in the way of trained engineers in the next five or ten years on the basis of their own assumptions as to the progress of their industries.

Mr. A. S. Quartermaine (a civil engineer) noted that the report was devoted mainly to the manufacturing industry. The need for qualified engineers in other fields was, he said, equally pressing.

Sir Hamish D. MacLaren (Admiralty) emphasised the importance of encouraging boys from the public and grammar schools to take up engineering as a career and welcomed the establishment of a fund by a group of industrialists to help to bring up-to-date the laboratory facilities in these schools. He also stressed the importance of opportunities for engineers to prepare themselves for managerial posts.

Sir Frederick Brundrett (Ministry of Defence) said research was a popular fetish at present, but development was absolutely vital to the future of the country, and for this people with all kinds of qualities and training were essential.

Mr. B. L. Metcalf (National Coal Board) called attention to the increasing opportunities for mechanical, electrical and civil engineers in mining.

Three-Point Attack

Mr. C. T. Melling (Eastern Electricity Board) urged a three-point attack on the boy, the parent and the school as a means of increasing recruitment. He deprecated the tradition that the classics and humanities were the only real road to education and that there was something socially undesirable about engineering. He urged more firms to take part in the scheme by which boys—at ordinary as well as at advanced levels—went to vacation courses.

Sir Harold Roxbee Cox thought the new National Council for Technological Awards would exert its influence in the direction of sandwich courses of a high standard, but he agreed that there must also be expansion in university departments.

Mr. D. B. Welbourn (University of Cambridge) drew attention to the difficulty of finding sufficient teachers of science for both schools and universities, and to the disparity in remuneration, not at the top of the engineering profession but at average level, as compared with other professions. It might improve standards if people were required to do two years in graduate apprenticeship before reading for a Ph.D. degree.

Mr. S. E. Goodall said he thought the report underestimated rather than over-estimated the problem. The percentage shortage in the smaller units in industry and in operating industry, as compared with the manufacturing section of industry to which the report was mainly devoted, was somewhat appalling. British Railways, for instance, would require an increasing number of electrical engineers for their development plans, and atomic energy plants would make large demands for engineers. As regards quality, he said, the demand for men with broad training in engineering and with the qualities of leadership and personality was completely unsatisfied.

The President (Sir George Nelson, Bt.), who took the chair, said those who were concerned with the future standards of the world had almost a mission to produce more scientists and engineers. Apart from medicine, no profession was contributing more to the benefit of man in the world of the future than electrical engineering and engineering in general. The need for an increase in quantity with no deterioration in quality could not be overemphasised. He thought the insistence on examinations might be losing a number of people with managerial ability. Great attention should be paid to teaching and he wondered whether efficient use was being made of scientists and technicians in view of the amount of duplication in the world in general on the ground that it was good competition.

At the meeting the film "The Inquiring Mind," prepared for the recruitment campaign of the Institution, was shown.

Visit of Soviet Engineers

SEVERAL months ago, in association with the British Council, the Central Electricity Authority invited a delegation of technical engineers of the U.S.S.R. to visit Britain for a three weeks' study tour of power stations and the electricity supply system. The invitation was on a reciprocal basis and it was agreed that a British delegation comprising Lord Citrine, the chairman of the Authority, and twelve engineers, together with a secretary and interpreter, would make a similar visit to Russia.

Last week the Authority was informed by the Russian Embassy, and learned with pleasure, that the Russian delegation would be led by Mr. Malenkov, Minister of Power Stations of the U.S.S.R. and formerly Prime Minister.

The Soviet delegation was expected to arrive yesterday (Thursday) and the British delegation to Russia will probably leave about 17th April.

Among the power stations to be included in the tour are Battersea, Hams Hall, Castle Donington, Carrington, Fleetwood, Braehead, Loch Sloy (hydro-electric station of the North of Scotland Hydro-Electric Board), Brighton, Marchwood, Littlebrook and Brunswick Wharf, together with the supergrid substations at Carrington and Elstree, the C.E.A. research laboratories at Leatherhead and training establishments at Horsley Towers. The delegation will also visit the Atomic Energy Authority's establishment at Harwell and the nuclear power station at Calder Hall. Electrical plant manufacturers' works to be visited include those of the General Electric Co., Ltd., the English Electric Co., Ltd., the Metropolitan-Vickers Electrical Co., Ltd., Babcock & Wilcox, Ltd., and Scottish Cables, Ltd.

Electrical Engineers Exhibition

PREVIEW OF NEXT WEEK'S DISPLAYS AT EARLS COURT

This year over 300 manufacturers, associations and other organisations are participating in the Electrical Engineers (A.S.E.E.) Exhibition to be held at Earls Court, London, from Tuesday to Saturday, 20th to 24th March. Compared with last year this represents an increase of over 70 in the number of exhibitors and altogether there will be more than £1,000,000 worth of equipment on show. While the exhibits to be seen will cover a very wide field, ranging from generation and distribution equipment to the actual installation materials, cables and wires, lighting fittings, instruments, and other industrial and domestic equipment, attention is particularly drawn to automation by a huge backcloth in colour. Two awards will again be made to the manufacturers exhibiting the most original industrial and domestic devices.

The exhibition is being officially opened at noon on Tuesday by Mr. Peter Thorneycroft, President of the Board of Trade. It will be open, to the trade only, daily from 10 a.m. to 7 p.m. (Wednesday until 9 p.m.).

AC-Delco Division of General Motors, Ltd., Dunstable, Beds.—**Stand G18.**—Exhibits cover a wide range of f.h.p. motors including capacitor start and split-phase types, rotor and stator units, a.c./d.c. universal motors and l.v. d.c. motors. A display of special interest is an enlarged working model of the "Thermotron" overload protection device and a push-button operated cut-away motor with stroboscopic lighting effect to freeze the action of the centrifugal switch.

Acral, Ltd., Alexandra Road, Enfield, Middlesex.—**Stand L2.**—Included among a range of f.h.p. geared motor units displayed on this stand is the company's type BM2. It is a $\frac{1}{10}$ h.p. drip-proof enclosed, continuously rated permanently split capacitor motor, fitted with sleeve bearings. Reduction is by hardened worm and plasticised laminate worm wheel.

Aerialite, Ltd., Castle Works, Stalybridge, Cheshire.—**Stand D3.**—Among the cables exhibited are the "Ashton" and "Ashathene" power and lighting cables, general purpose cables, flexibles, armoured cables and miscellaneous special purpose cables, including single and double wire armoured types for power and mining applications. Of interest is a new range of "Aeraxial" high frequency cables, incorporating a five air cell construction, that has been designed to meet demands for low-loss coaxials and twin feeders in the television, radio and electronic fields.

Aero Research, Ltd., Duxford, Cambridge.—**Stand N3.**—Specimens in which "Araldite" epoxy resins are employed illustrate their applications as impregnants, casting, potting and encapsulating materials. Of particular interest to the heavy electrical industry are gravity casting resins, hot- and cold-cured resins for glass cloth laminates, coatings and adhesives.

Agro Electrical Co., Ltd., 60–66, Wardour Street, London, W.1.—**Stand G1.**—A complete range of Bakelite lampholders including switched types; Bakelite ceiling roses, junction boxes, suspension switches, line cord switches, torpedo switches, door switches; two-light adaptors with switch and various connectors are displayed. In addition there is a comprehensive range of electric bells, bell transformers, bell indicator boards, etc.

Allen West & Co., Ltd., Brighton, 7.—**Stand M15.**—In addition to a wide selection of standard motor starters, both hand-operated and automatic designs, and oil-break switchgear, this company is featuring two important developments in the field of crane control.

Arrow Electric Switches, Ltd., Hanger Lane, Ealing, London, W.5.—**Stand H22.**—Exclusive design features of the company's magnetic contactors include a right-angled movement, easily removable contacts, two breaks per pole, and the use of "Plascon-Alkyd" for mouldings—a material for which a high surface resistivity is claimed. The range consists of 30, 50 and 100 A sizes. These contactors are also incorporated in a range of direct-on-line starters, rated up to 10 h.p., and for use with these there is a range of enclosed push-button stations. Magnetic relays are also on view, and new switches for the control of portable electric tools.

Ashley Accessories, Ltd., Ulverston, Lancs.—**Stand K14.**—Accessories for lighting and power installations include a range of 13 A socket and switchsocket-outlets, fused plugs, fused adaptors, and selective entry spur junction boxes. "Ashley" tumbler switches are shown under test. Mounting blocks in two sizes, 2¼in and 3¼in diameter, enable surface mounting accessories to be installed with the cable cores in a non-ignitable enclosure.

Astral Switchgear, Ltd., Alma Road, Enfield.—**Stand K14.**—A range of l.v. distribution equipment includes h.r.c. fuse switchgear of 60, 160 and 300 A ratings, K.E.M.A. short circuit tested at 35 MVA, and type tested for load making and breaking, to B.S. 861. Among other exhibits are fuseboards, busbar chambers, link boxes for l.v. power and telephone cables, multiway terminal units and heavy duty adaptable steel boxes for surface, flush and weatherproof mounting.

Automatic Coil Winder and Electrical Equipment Co., Ltd., 92–96, Vauxhall Bridge Road, London, S.W.1.—**Stand G4.**—"Avo" exhibits include multi-range testmeters, valve voltmeters, signal generators, universal bridges, coil winding machines, taping machines, valve testers and electronic multimeters. The electronic and nucleonic engineer will find various items of test gear of interest, particularly the d.c. amplifier which is capable of giving a full scale measurement for 3 × 10–13 A.

Backer Electric Co., Ltd., Fitzwilliam Road, Rotherham, Yorks.—**Stand C2.**—Emphasis is on the application of tubular sheathed elements to industrial, rather than domestic, appliances and examples cover railcar heating, tank heating by clamp-on and immersion elements and turbine bolt tightening by expansion methods.

Bakelite, Ltd., 12–18, Grosvenor Gardens, London, S.W.1.—**Stand O18.**—Of particular interest are the recently developed copper-clad materials for printed circuits, and "compregnated" wood, an immensely strong laminate for heavy industrial insulation. Glass laminates based on melamine, silicone and phenolic resins are also displayed. Additions to the range of moulding materials include rubber modified phenolics and alkyd moulding materials. The display also features "Vybak" p.v.c. materials, from which components such as flexible terminal strips are made.

H. J. Baldwin & Co., Ltd., 132, Arkwright Street, Nottingham.—**Stand N20.**—Civil and General Engineering Division: Cable protection covers, stoneware conduits and joint boxes, transmission and distribution accessories, unit-construction fencing, and "Wilson" turret-jaw bench and machine vices are displayed. Electric Appliance Division: "Wireohms" heating elements, immersion type kettle elements, "Thermat" blankets and pads.

Belmos Co., Ltd., Bellshill, Lanarkshire.—**Stand N19.**—Flush-fronted multitier switchboards, including the recently introduced four- and five-tier formation; type "E" pillar as used for electric furnace control; and contactor units for capacitor switching in p.f. correction. Flameproof equipment includes a gate end box, drill control unit, lighting fittings, etc.

Benjamin Electric, Ltd., Brantwood Road, Tottenham, N.17.—**Stand G10.**—An entirely new lighting unit, the prototype of which is being displayed for the first time, is the "Teelon" unit and canopy housing fluorescent tubes which illuminate the underside and the surrounding area underneath. Designed primarily for petrol pump islands and similar locations, the unit sections can be joined to make up any length and the apertures underneath can be fitted with dust and vapour excluding covers. The dustproof "Flurolier" fitting is designed to meet arduous conditions where fluff, humidity and temperature can otherwise be detrimental, and the Benjamin "Mushroom" fitting is for post top mounting, with tungsten, mercury or sodium lamps. The company's floodlights include a modified version of the "Duoflux" fitting.

Besson & Robinson, Ltd., East Industrial Estate, Harlow, Essex.—**Stand A1.**—The principal exhibit is the recently announced miniature 20 A d.p.c.o. relay, type J.04, which has such features as screw terminals, tropical finish, and ability to operate over a wide voltage range, both

50 and 60 c/s. New models on view for the first time include a delayed action mercury switch relay (type C.11), and types J.01/P and C.01/P plug-in relays.

Beta Manufacturing Co., Poplar Works, Valley Road, Shipley, Yorks.—**Stand N1/2.**—Among a range of contemporary lighting fittings displayed on this stand are the "Tulip" series of pendants and floor standards. In addition there are contemporary display fittings for stores, hotels, cinemas, etc., including spotlights, recessed and semi-recessed fittings and a new mercury-tungsten recessed fitting with diamond louvre.

Bill Switchgear, Ltd., Aston Lane, Perry Barr, Birmingham, 20.—**Stand M16.**—A selection of l.v. switch and distribution gear includes items from a range of metal-clad distribution fuseboards, with interchangeable fuse carriers for h.r.c. or rewirable fuses, in sizes from 15 to 300 A. The "Royal" and "Imperial" ranges of ironclad switches and switchfuses for heavy duty on power, heating and lighting circuits are also prominent. Included with the "Crown" range of a.c. s.p. and n. switches are 60 A all-insulated 4-way switch splitters, exhibited for the first time, and also on view is a full range of domestic switchgear and accessories including the "Master" cooker switches. Among new designs are two a.c. slow break switches of 30 and 60 A capacity, a flush mounting pilot switch and new "Civic" consumers' control units.

Thomas Bolton & Sons, Ltd., Mersey Copper Works, Widnes, Lancs.—**Stand L23.**—Exhibits include wire and strand, bar and rod, sheet, strip and foil, commutator and other sections, tubes and machined parts; "Combarloy" h.c. copper and chromium copper commutator segments; hard drawn high conductivity busbars; Bolton's patent cellular conductor, which has found its chief application in e.h.v. busbars of outdoor substations, and a display of copper and aluminium-nickel-iron bronze rotor and stator end rings.

F. H. Bourner & Co. (Engineers), Ltd., Manor Royal, Crawley, Sussex.—**Stand R7.**—The "Supadynamic" power driving tool is shown in operation on this company's stand.

S. O. Bowker, Ltd., 19–21, Warstone Lane, Birmingham, 18.—**Stand B3.**—A full range of "Tenby" electrical accessories and an interesting development in the introduction of plaster depth steel boxes for ¾in conduit which incorporate an integral adjustment to ensure that the accessory is automatically located in relation to the plaster surface of the wall.

Bowthorpe Electric Co., Ltd., Tinsley Lane, Crawley, Sussex.—**Stand G15.**—This company's exhibits are combined with those of their associated company, Hellermann, Ltd. Bowthorpe show a range of linesmen's tools and line fittings for aluminium and copper electricity supply lines. Hellermann display solderless cable terminals and their binding system.

British Electrical and Allied Industries Research Association, 5, Wadsworth Road, Perivale, Greenford, Middlesex. — **Stand C10.** — Apparatus developed at the Association's own laboratory includes lagged thermometers for indicating the instantaneous effective temperature of air or cooling medium; a cable and joint compression testing machine; apparatus for the measurement of corona resistance of materials; and an experimental arc chute.

British Electrical Development Association, 2, Savoy Hill, London, W.C.2.—**Stand C11.**—Display material relating to E.D.A. activities, together with books, brochures and leaflets dealing with the use of electricity. Particulars are also given of the latest E.D.A. films which are available on free loan to interested groups.

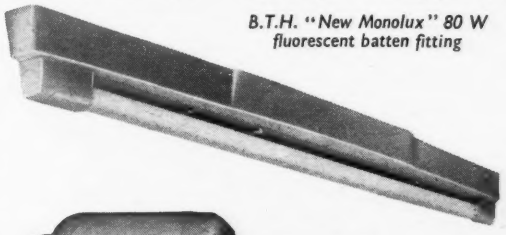
British Electrical Repairs, Ltd., 10, Charlotte Street, Manchester, 1.—**Stand L17.**—The electrical plant repair service operated by this company is indicated by samples of the wide range of coils manufactured, insulated to class "A," "B" or "H," for l.v. and e.h.v. service.

British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2.—**Stand J11.**—This company includes in its display copper and aluminium busbars, strips and sections, current collection equipment for cranes and conveyors, heavy-duty cut-outs, claw type cable cleating system, glands for armoured p.v.c. cables, earthing equipment, indoor terminal boxes, detachable fused tee boxes, flameproof couplers and winding wires.

British Physical Laboratories, Houseboat Works, Radlett, Herts.—**Stand K6.**—Latest developments include an electrical tachometer incorporating a counting mechanism for integration of the units being measured, the "Trans Ranger" voltmeter and a 3½in controller pattern ammeter. Universal test sets and pocket voltmeters are available for inspection.

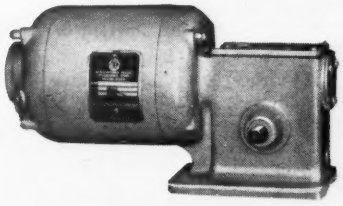
British Standards Institution, 2, Park Street, London, W.1.—**Stand C7B.**—A series of coloured panels provide the background for five selections of British Standards and Codes of Practice dealing with: electric power, from source to user; installation—methods, materials and accessories; domestic appliances; instrumentation, nomenclature and symbols; and the B.S.I.'s service to exporters.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2. — **Stand H20.** — Lighting equipment shown includes the "New Monolux" 80 W streamlined fluorescent batten fitting; a range of reflectors and diffusers all of which are interchangeable on the standard B.T.H. channel power pack; and an industrial overlamp closed-end vitreous enamelled reflector fitting. Three types of lighting trunking, "Universal," "Invertrunking" and Ediswan shallow trunking, are also shown as well as the "Mazda" M.11 area floodlight, designed for use with a 1 kW MA/H mercury discharge lamp; a new 4ft reflector fluorescent lamp; and the latest addition to the "Mazda" range of colour-corrected mercury fluorescent lamps, the 250 W MBF/U; together with a

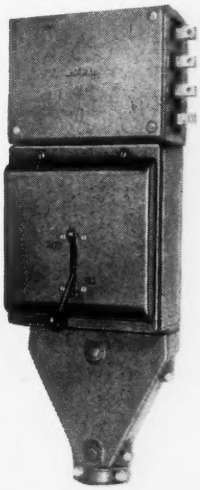


B.T.H. "New Monolux" 80 W fluorescent batten fitting

Aerialite 1/·044 19-pair s.w.a. multi-pa telephone cable

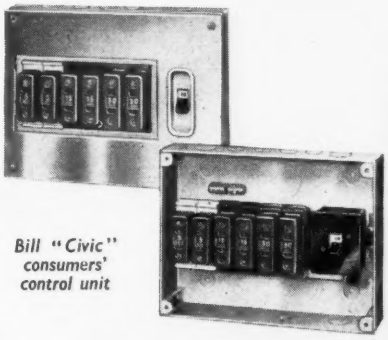


Acral type BM2 geared motor unit



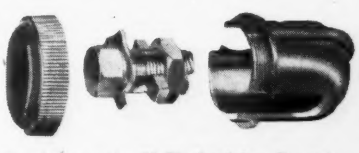
Arrow push-butto station

Left: An h.r.c. fuse switc with busbar chamber an cable sealing box (Astr Switchgear, Ltd.)

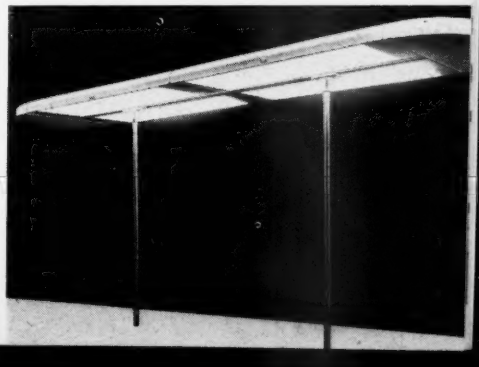


Bill "Civic" consumers' control unit

Below: Benjamin "Teelon" illuminated canopy assen for petrol pump islands



Bowthorpe series AL.58 aluminium line tap



140 W sodium lamp with an integral thermal jacket. Motor exhibits include a selection from a range available for single- or three-phase supply, and with all forms of mounting and types of enclosure.

Brook Motors, Ltd., Empress Works, Huddersfield.—**Stand F8.**—This company enter a new market with their latest fractional horse power motor, the "Merlin," which embodies many of the features of the "Gryphon" motor but has been made to a shorter overall dimension to enable it to be fitted in the confined space of a washing machine cavity. A new push-button starter for motors up to ½ h.p. is also exhibited. A full range of industrial motors up to 600 h.p., a wide selection of f.h.p. motors and a range of control gear complete the display.

Brush Electrical Engineering Co., Ltd., Loughborough.—**Stand L16.**—This company's motors are available from 1 to 5,000 h.p., and on display is the latest "non-breathing" flameproof motor with specially encased stator windings; it is available from 10 to 150 h.p. A wide range of switchgear and fusegear includes an air insulated, vertical isolation, horizontal drawout 6·6/11 kV units of the VBA type; a "Q" circuit-breaker with hand closing mechanism; a 6·6/11 kV oil switch; a 600 A m.v. distribution switchboard with fuse switch units; a newly designed horizontal drawout, metalclad, m.v. industrial circuit-breaker; and h.r.c. fuse links in sizes from 2 to 800 A.

Bryce Electric Construction Co., Ltd., Kelvin Works, Hackbridge, Wallington, Surrey.—**Stand P4.**—From this company's transformer range the largest exhibit is a 4,500 kVA 33/3·3 kV 3-phase, 50 c/s, oil immersed transformer removed from its tank to enable closer inspection. Various types of power capacitors on view include one specially designed for mining use and a demonstration panel shows how power factor can be improved by capacitors controlled by an automatic p.f. relay.

Bulpitt & Sons, Ltd., Swansea Works, Birmingham, 1.—**Stand M32-33.**—The "Birmingham" range of "B.K.B." electric motors made by this company includes single-phase motors from ½ to 3 h.p., three-phase motors from ½ to 7½ h.p., d.c. motors from ½ to 25 h.p., a.c. and d.c. generators up to 30 kW, flange mounting a.c. and d.c. machines, generators for close coupling to diesel or petrol engines, motor generator sets, and rotary convertors. Among a number of examples from the "Swan" range of electrical appliances are electric kettles, coffee percolators, fires, toasters, urns, wash boilers, heating pads and blankets.

Burgess Products Co., Ltd., Micro Switch Division, Dukes Way, Team Valley, Gateshead, 11.—**Stand N13.**—The display includes some 200 different British made micro switches. Amongst the new models being shown for the first time is a small plastic-cased micro switch which operates by the merest touch on a wire actuator. Also shown are two new metalclad switches which are completely sealed against the ingress of moisture yet small enough to pack into a match box.

Cable Makers' Association, 52–54, High Holborn, London, W.C.1.—**Stand B1.**—This stand features pictorially various aspects of development research and testing undertaken by members to ensure that whatever the problem set by industry, a C.M.A. cable of proven high standards can be produced to provide the answer.

Cantie Switches, Ltd., Port Causeway, New Ferry, Birkenhead.—**Stand G7.**—Centralised control of electric light, heat and power circuits in terms of space, economy and flexibility is well catered for in the Cantie "Minunit" cubicle switchboard, which is the principal exhibit of this company's display. Also exhibited are selections from its range of normal and heavy duty switches and switch fuses and flameproof gear.

Central Electricity Authority, Winsley Street, London, W.1.—**Stand C5.**—The Authority's display depicts the future generation of electricity from nuclear energy. There is also an inquiry bureau from which publications and general information regarding the organisation and progress of the electricity supply industry are available.

Channel Conduits, Ltd., 11, Victoria Street, London, S.W.1.—**Stand K27.**—The principal exhibit is the company's standard range of spring capped patented cable trunking, complete with accessories. The "Pancake" overfloor ducting system is also displayed.

Chilton Electric Products, Ltd., Hungerford, Berks.—**Stand E6.**—Representative units from the range of "Atlas" miniature h.r.c. circuit-breakers for ratings up to 60 A and "Chilton" voltage-operated and core balance circuit-breakers are demonstrated on this stand. Also displayed are "Buk," "Kub" and "Twin" electric dry shavers, together with samples of shaver accessories and the "Chilton" home hair clipper.

Clang, Ltd., Cricklewood, London, N.W.2.—**Stand L19.**—A representative range of this company's domestic electrical accessories includes a new 13 A twin socket and 13 A multiplug, both of which incorporate an independent shuttering arrangement which can only be operated when the three pins are inserted.

Clare Instrument Co., 8, South Street, West Worthing, Sussex.—**Stand O2.**—Emphasis is on industrial test gear with special reference to the requirements of the relevant B.S. specifications, including a demonstration of the use of a.c. for insulation resistance measurement to permit simultaneous flash and insulation resistance tests. Limit bridges for resistance measurement include a new a.c. operated pattern for the heating element industry, earth leakage indicators, earth continuity testers, 500 V d.c. megohmmeters, and variable frequency a.c. generators with output up to 1 kVA.

E. K. Cole, Ltd., Ekco Works, Southend-on-Sea.—**Stand N14.**—Among a wide range of "Thermovent" electric heating equipment displayed is a new and improved type of radiant glass "Thermopanel" which incorporates many new features, including the use of a non-reflecting glass, which does not show smears or marks, and a pilot lamp. A new drying cabinet heater with a three-heat switch is also on show.

Connollys (Blackley), Ltd., Manchester, 9.—**Stand P7.**—The Cable Division exhibits conventional types of p.i. mains cable up to 11 kV, the latest types of plastic cables, ignition cables and flexible cords, and "Blackley" insulating tape. In addition a wide range of telecommunication cables are displayed. The Wire Division shows winding wires of all types.

Contactum, Ltd., Victoria Works, Edgware Road, Cricklewood, London, N.W.2.—**Stand N12.**—Although this company displays its well-known range of switches, ceiling switches, plugs and socket-outlets, this year the accent is on a.c. only switched sockets and switches, and the 13 A ring mains range of shuttered accessories. Also new is a 30 A 3in joint box for ring mains. Bell pushes, adaptors, ceiling roses, iron and flex connectors, striplighting holders, switch-plates, etc., complete the display.

Copper Development Association, Kendals Hall, Radlett, Herts.—**Stand R1.**—Items of electrical equipment relating to many branches of the industry on display include a large rotor ring, busbars, commutators and cable sections; electroformed and beryllium copper waveguides; laminates and printed circuits; chromium copper electrodes and beryllium copper springs; electric traction components of cadmium copper; examples of crimped joints, an aluminium bronze heavy connector, and radio valves.

Courtney, Pope (Electrical), Ltd., Amhurst Park Works, Tottenham, N.15.—**Stand N18.**—This company introduces several additions to its range of lighting fittings including a series of ceramic units. In addition are shown the "Flouvre" anti-glare device for fluorescent tubes, and the "Controlite" reflector for general service lamps. A series of standard lighting panels and units suitable for use with "Frenger," "Celotex" and other types of suspended ceilings are also displayed.

J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall, Staffs.—**Stand J6.**—Among the wiring accessories on display are a variety of shockproof "Lincoln" and "Standard" flush and surface mounting tumbler switches and "Lincoln" ceiling switches. Also included are the recently introduced "Lincoln" type "AC" flush switches, in 1, 2, 3 and 4 switch arrangements; "Jacelite" plate and disc accessories, adjustable grid assemblies and metalclad switches, socket-outlets and indicator units for domestic and industrial purposes. A motor control gear selection incorporates limit switches for push-rod, roller, right-angle plunger and arm-and-roller operation; type D-6 (hand-operated), type A-15 (oil-break) and type B-15 (air-break) starters.

Critchley Bros., Ltd., Brimscombe, Stroud, Glos.—**Stand N8.**—As manufacturers of cable markers, turnings and injection mouldings for the electrical trade this company exhibits a wide range of interlocking cable ferrules and sleeves, engraved labels, phase buttons, etc.

Crompton Parkinson, Ltd., Crompton House, Aldwych, W.C.2.—**Stand D5.**—Three totally-enclosed fan-cooled induction motors in the company's series 4 "Klosd" range are among motor exhibits on this stand, one of which, a 5 h.p. 4-pole machine, is sectionalised. The remainder are of 1 and 7·5 h.p. respectively, and all have standardised dimensions to B.S.2083. Among a representative selection of seven motors covering the main types in the range ½ to 1½ h.p. is the recently developed "A" design, series 50 motor. This has been designed to meet the particular requirements of the domestic appliance market. The new series 85 range are drip-proof sleeve bearing single-phase capacitor-start induction-run fractional types which meet a variety of heavy duty requirements such as refrigerator and compressor drives.

Davis Sheet Metal Engineering Co., Ltd., Angel Road, Edmonton, London, N.18.—**Stand N15.**—Cable trunking with "quick-fix" covers, floor trunking with chequer plate and tray type covers to take floor covering are exhibited in various forms. Also to be seen is skirting trunking of many sections and compartments,

solid section under-floor trunking with junction boxes and a new pattern floor trap.

G. P. Dennis, Ltd., Fleming Road, Speke, Liverpool.—**Stand H12.**—Examples of the "CH" range of combination fused switches from 60 to 800 A are shown both in the standard cast iron form and built into cubicle switchboards. Other exhibits comprise substation distribution equipment including examples of indoor wall mounting distribution frames; and a comprehensive range of rewirable and h.r.c. switch and fuse gear. Examples of the "Hi-Style" cabinet type distribution board are on display.

Dexion, Ltd., 65, Maygrove Road, London, N.W.6.—**Stand H9.**—Supplied in standard packets of ten 10ft lengths, complete with 75 nuts and bolts, steel "Dexion" slotted angle is rust protected and stove-enamelled battleship grey.

"Diamond H" Switches, Ltd., Gunnersbury Avenue, London, W.4.—**Stand M4.**—Prominence is given to the packet switch range, which now includes special features for the more complicated circuits associated with motor control. New items of interest are oven thermostats with modern metal escutcheons; hydraulic thermostats for washing machines, fish fryers and back-bar equipment, and series 9T toggle and trigger switches for machine tool applications.

Dimplex, Ltd., Millbrook, Southampton.—**Stand K7.**—Completely portable, the company's range of oil-filled electric radiators are available in eight finishes and in various loadings from ½ to 2 kW. All are thermostatically controlled and can be supplied with three types of mountings—feet or wall brackets, or castor wheels.

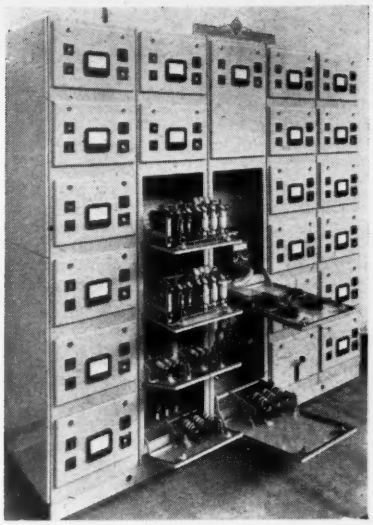
Donovan Electrical Co., Ltd., 70–82, Granville Street, Birmingham, 1.—**Stand G17.**—A.c. motor starters, power relays and contactors, and a selection of control accessories, including foot operated switches, limit switches, terminal blocks, etc., also examples of a 10 A power relay up to 8-pole. Also shown are "Donlok" and "Safuse" switchgear, interlocked switch plugs, the "Donlok" crane safety switch, "Reylovolt" transformers and the "Runtact" overhead power duct.

Dorman & Smith Group of Companies, Ordsal Electrical Works, Manchester, 5.—**Stand H18.**—Visitors to this stand can see the "Dorman" method of switchboard construction. Exhibits also show how the company's switches can be easily installed in existing cubicle boards with a minimum of structural alterations. The fused switch range has been extended and includes 30 to 300 A types. Other exhibits include 500 V "Flowline" distribution boards, the "Loadmaster" and "Safeset" miniature circuit-breakers; portable handlamps and the "Diolux," "Diolume" and "Diopal" range of prismatic lighting fittings.

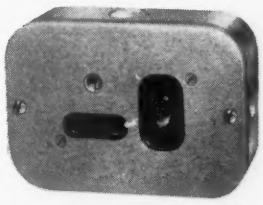
D.S. Plugs, Ltd., show a wide range of fused plugs and sockets including the "King-pin" fused plug. This company also specialises in cooker control units, industrial fused plugs and sockets and, for the laboratory, a special range of plugs and sockets.

British Klockner Switchgear, Ltd., demonstrate the complete versatility of their motor control equipment and there are a number of exhibits of special control panels using BKS controls of various types. Remote control and push-button starters are also displayed.

Alorite, Ltd., show examples of ceramics for the compounding of latex and the grinding of pigments, fine chemicals, pharmaceuticals and rubber chemicals.



Electro Mechanical Mfg. Co.'s flush fronted cubical type "Y" switchboard, with incoming metering starters and switches, all with lift-off doors



Ediswan "Avon" 15 A metal-clad surface switch socket outlet with protected nylon dolly

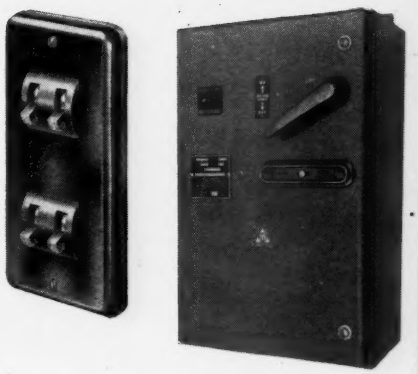
Dowding & Mills, Ltd., 24–26, Whitepost Lane, Hackney, London, E.9.—**Stand K23.**—This company, specialists in industrial electrical repairs covering the rewinding of motors, alternators, generators and transformers, also carry out a metal spraying process for the reclamation of worn components.

Dowty Group, Ltd., Cheltenham.—**Stand E13.**—Three member companies, Dowty Equipment, Ltd. (Electrical Division), Dowty Nucleonics, Ltd., and Dowty Seals, Ltd., display a wide range of switches and indicators for remote control systems, electronic and electro-magnetic tachometers and electro-mechanical counting equipment, together with a selection of natural, synthetic and silicone rubber seals, washers and mouldings.

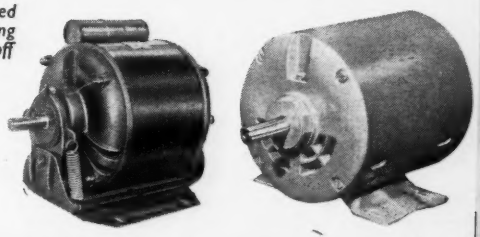
D.P. Battery Co., Ltd., Bakewell, Derbyshire. — **Stand K5.** — Exhibits demonstrate the comprehensive range of open and sealed-in cells of D.P. manufacture suitable for all stationary applications in generating stations and telephone exchanges, for emergency lighting units, etc. "Kathanode" traction batteries are represented by cells for all types of electric vehicles.

Dubilier Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, North Acton, London, W.3.—**Stand G20.** — Exhibits include power factor correction capacitors, and a p.f. correction demonstration set; "Duconol" capacitors for fluorescent lighting and other a.c. applications; "Drilite" capacitors for a.c. capacitor start motors; mains suppressor plugs and devices; h.v. and h.f. resistors.

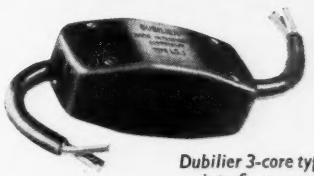
Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.—**Stand F6.**—Among recently introduced accessories are a twin switch unit providing two 5 A flush switches in a 1-gang size plate to fit the existing 1-gang box; a metalclad switch with an aluminium finished pressed steel box; 5 and 15 A pressed steel metalclad surface switch-socket outlets with protected nylon dollies; and an all-moulded ceiling switch with a nylon connector.



Above left: J. A. Crabtree "Lincoln" type a.c. "twin-twin" flush switch. Above right: E.A.C. automatic star-delta starter



Left: One of the Crompton Parkinson series 85 range of motors. Right: Brook "Merlin" washing machine and domestic appliance motor



Dubilier 3-core type cord-grip interference suppressor

E. F. Electric, Ltd., Willow Lane, Watford, Herts.—**Stand K28.**—A range of 2, 5, 13 and 15 A plugs, sockets, switch-sockets and switches includes recently introduced 5 A a.c. plaster depth switches for both 1 and 2-gang.

Ega Electric, Ltd., Holyhead Road, Wednesbury, Staffs. — **Stand K29.** — Exhibits include the "Mity Atom" 10 A all-porcelain switchfuse, plug-in starters and motor control gear, "Egatube" non-metallic conduit, and various domestic appliances.

Ekco-Ensign Electric, Ltd., 45, Essex Street, London, W.C.2.—**Stand H15.**—Fluorescent fittings include industrial, commercial and decorative types. This company, which has been largely responsible for the introduction of colour into decorative and semi-decorative fluorescent fittings, also exhibits its "Pendant" fitting, the transverse louvres of which are available in a series of colours.

Electric Construction Co., Ltd., Bushbury Engineering Works, Wolverhampton.—**Stand O14.**—A working model illustrating the general principles

of electrical precipitation and a display of "easily-assembled" contactor switchgear are on this stand. Other exhibits include a complete stator of a 920 b.h.p. 11 kV 3-phase synchronous motor for a compressor drive, a 175 b.h.p. 415 V 1,500 r.p.m., size 272 slip-ring motor of the screen protected type.

Electrical Apparatus Co., Ltd., St. Albans.—**Stand J9.**—This company displays a.c. and d.c. manually-operated and fully automatic motor control gear and accessories, industrial and flameproof types, in addition to a range of direct-on push-button starters including the new "Autette" and "MFO" f.h.p. auto-switches. Accessories include float switchgear, rotary selector switches, local and remote push-button stations, etc.

Electrical Industries Benevolent Association, 32, Old Burlington Street, London, W.1.—**Stand C7A.**—This stand is in the form of an information bureau to give particulars of the activities of the E.I.B.A.

Electrical Remote Control Co., Ltd., Eastern Industrial Estate, Harlow New Town, Essex. —**Stand O9.** — Exhibits include fully automatic and hand set synchronous process timers, sequence timers, automatic condenser timers, relays, and an industrial l.v. soldering iron busbar installation with mains transformer units and l.v. soldering irons.

Electrical Review Publications, Ltd., Dorset House, Stamford Street, London, S.E.1.—**Stand C6.**—Representatives are available at this stand to deal with inquiries relating to all matters connected with the electrical industry. Up-to-date and authoritative technical books on various aspects of electrical engineering are displayed.

Electro Dynamic Construction Co., Ltd., St. Mary Cray, Kent.—**Stand K25.** —Examples of marine electrical equipment; alternators, generators and rotary convertors; power plant of special design for use in radar and telecommunications, etc.; lightweight battery-electric traction motors; f.h.p. motors with governed variable speeds; rotary convertors and transformers; control gear, including hand controlled and fully automatic starters; voltage regulators for h.f. alternators; and equipment for the control and protection of internal combustion engines.

Electro Mechanical Manufacturing Co., Ltd., 133–135, Grand Buildings, Trafalgar Square, London, W.C.2.—**Stand P5.**—The cubicle type of control boards on show embrace motor starters (contactor type) and switch fuses.

Elliott Brothers (London), Ltd., Century Works, Lewisham, S.E.13.—**Stand M28.** — Here are transformer test sets, reflecting dynamometer instruments and standard and sub-standard instruments. Portable and panel mounting recorders covering miniature, standard and potentiometer types are also shown together with applications of speed measuring equipment to marine, locomotive and industrial purposes. Further exhibits include the latest CO_2 meter, a hermetically sealed moving coil relay, and a new introduction, the "Bristol's" hermetically sealed syngroverter switch.

George Ellison, Ltd., Perry Barr, Birmingham, 22B.—**Stand G12.**—Special arrangements on this stand will be part of the celebrations to commemorate the jubilee year of the company. Exhibits include a comprehensive display of "Ellison" switchgear ranging from an h.v. circuit-breaker unit down to limit switches and emergency push switches. Included in a display of starters, control panels and circuit-breakers is the recently introduced "Ellison" 20 A oil-break circuit-breaker for direct-to-line starting and for feeder circuits.

E.M.B. Co., Ltd., Moor Street, West Bromwich.—**Stand M26.**—Exhibits include a jointless, unbreakable and rustless resistance comprising two banks of grids; an a.c. 7-notch drum type controller; compressor starter panel complete with water pump starter; contactors; accelerating and overload relays; and a "Microsen" unit, an a.c. speed control unit enabling complete control of both hoisting and lowering loads from creep speeds (10 per cent speed) up to full speed.

E.M.I. Electronics, Ltd., Hayes, Middlesex.—**Stand O4.**—"Electronics in Industry" is the keynote of this exhibit which features a wide range of the specialised equipment for many industrial requirements. The type 3C stroboscope shown is an improved version of the high powered white light stroboscope exhibited last year. A completely new instrument, the type 1 electronic tachometer, is designed primarily for precision measurement of rotary shaft speed, but is also suitable for any similar applications where knowledge of the repetition rate of cyclic events is required.

E.M.S. Electrical Products, Ltd., 28–32, The Butts, Coventry.—**Stand J4.**—"Uniduct" three-phase feed rails for hoists, conveyors, etc., are shown.

Enfield Cables, Ltd., Victoria House, Southampton Row, London, W.C.1.—**Stand E11.**—This stand is illuminated by means of the "Grid Suspension" wiring system and features "Enfield" flat pressure cable and non-draining cables (mass-impregnated) for voltages up to 11 kV. Other exhibits include a wide range of rubber, thermo-plastic and mains cables; compression cables up to 275 kV, bare hard drawn copper wire and strand; paper or cotton lapped wires and strips for transformer and machine winding; and h.v. and l.v. joint boxes.

Engel & Gibbs, Ltd., Warwick Road, Boreham Wood, Herts.—**Stand G5.**—Control units featured by this company include an on-demand unit for the automatic control of small diesel-electric plants, a 60 A, 3-phase, off-peak tariff unit, and a grain dryer control for use with hygrometers or thermostats, automatically controlling heaters for crop drying.

Engineering & Lighting Equipment Co., Ltd., Sphere Works, Campfield Road, St. Albans.—**Stand H5.**—This company's exhibits range from miniature terminal units to the largest control panels, switches, fuse holders and bases, indicator lights, junction boxes, etc.

English Electric Co., Ltd., Queens House, Kingsway, London, W.C.2.—**Stand G11.**—Among examples of the company's switchgear is the class "E" range incorporating the "Isolector" mechanism with a breaking capacity of 150 MVA at 3·3 kV, and type OCH4N metalclad switchgear, a recently designed metalclad unit for ratings up to 750 MVA at 33 kV and current rating up to 1,200 A. Meters, relays and instruments are displayed, with examples of distribution transformers for rural and urban applications, and the core and windings of a 750 kVA substation transformer. Totally-enclosed, fan-cooled motors with special "chemical" features include a larger type of class LY machine recently introduced and designed to follow on the existing range of BS motors for outputs of from 15 to 50 h.p. in three frame sizes. Type 291 industrial actuator is shown as a working exhibit complete with typical control panel, position transmitter and position indicator. Domestic appliances complete the display.

Erskine, Heap & Co., Ltd., Lancashire Switchgear Works, Salford, Manchester, 7.—**Stand N17.**—Examples of the company's switchgear and motor control gear range include switchgear up to 11 kV, 250 MVA A.S.T.A. tested rupturing capacity; l.v. switchgear; motor control gear; d.c. circuit-breakers; knife switches; fuses; and instruments.

Everett, Edgcumbe & Co., Ltd., Colindale Works, Colindeep Lane, London, N.W.9.—**Stand O8.**—Electrical indicating and graphic or recording instruments include ammeters, voltmeters, wattmeters, frequency meters and synchroscopes, a multi-pen operation grapher, short period operation and time recorder, "Synclock" process timer, as well as moving-coil, moving-iron and high speed recording movements.

Evershed & Vignoles, Ltd., Acto Lane Works, Chiswick, W.4.—**Stand L8.** —Two new "Megger" insulation testers are on view, one of which is a mains operated series 1 instrument developed for testing voltages of 100, 250 and 500 V (selected by switch) and a range extending up to 10,000 megohms. The other is an addition to the range of series 2 instruments and has testing pressures of 250, 500 and 1,000 V and measures up to 200 megohms. Other "Megger" insulation testers displayed include hand driven, motor driven and mains operated instruments, and single and three voltage instruments. A section is devoted to a comprehensive display of recording, measuring and indicating instruments, both switchboard and portable, and other exhibits include "Dionic" water testing equipment, "Evershed" speed transmitters, f.h.p. motors and servo motors.

Expanded Metal Co., Ltd., Burwood House, Caxton Street, London, S.W.1.—**Stand J3.**—This is the first joint display of "Expamet" and "Cressall" products since the company acquired the Cressall Manufacturing Co. Forced-ventilated resistors for electric or diesel-electric locomotives and naturally ventilated under-coach resistors for multiple-unit railway stock are shown.

Falk, Stadelmann & Co., Ltd., 91, Farringdon Road, London, E.C.1.—**Stand K15.** — Among contemporary lighting fittings is the "Perseus" 8-light pendant, while fluorescent and tungsten industrial fittings include the "Winston," "Imperial" and "Grenville," and a cast aluminium fitting designed for goods yard lighting. In the electrical appliance section there is the "Caprice" 2 kW illuminated fire.

Fenton, Byrn & Co., Ltd., Airflow Works, Berrylands Road, Surbiton, Surrey. —**Stand H23.**—An improved range of propeller fans in sizes from 9 to 24in, together with ancillary equipment. One of the many fan applications shown is the range of roof cowls, including a special type which isolates the fan motor from the airstream when necessitated by the presence of corrosive fumes.

Ferguson, Pailin, Ltd., Higher Openshaw, Manchester, 11.—**Stand M13.** — Main exhibits are a 33 kV 1,000 MVA type VSLP9 indoor metalclad switch unit and a single-phase of a 275 kV type OA 300 outdoor air-blast circuit-breaker. Auxiliary products include control switches, instrument switches, h.r.c. fuses and secondary wiring components.

Ferranti, Ltd., Hollinwood, Lancs.—**Stand J12.**—A wide range of electrical products includes several new items and demonstration units of interest, among these being a lock wound core rural distribution transformer incorporating a new core design. The Instrument Department is represented by several demonstration units and a selection from a range of indicating and industrial instruments including hermetically sealed types. The new mercury computer is intended mainly for scientific work, its main characteristic being that all numbers are represented in "floating-point" form, which is claimed to increase the speed of the machine five-fold. The meter display includes a demonstration of a new single-phase meter test set and a conversion panel of a high speed testing set for a.c. meters. Domestic electrical appliances are also on view.

Fitzgibbon & Murray, Ltd., The Lower Mill, Ewell, Surrey.—**Stand E1.**—A full range of "Jeani" and "Ewell" lighting and bell accessories, also examples of machined parts of electrical apparatus from insulating materials.

V. & E. Friedland, Ltd., Macclesfield, Cheshire.—**Stand M3.**—In this exhibit of bell and chime equipment and transformer night-lights, five new chimes are introduced, the "Warbler Mk II," "Hi-Lo," "York," "Monarch" and "Cathedral."

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—**Stand H19.**—A comprehensive range of products includes a new system for lighting shop windows, developed by the company's research laboratories. It makes use of the recently introduced 125 W "Osram" colour corrected m.v. lamp, in conjunction with 200 W tungsten lamps, the two types of lamps being mounted alternately in standard "Gecoray" reflectors. Another application of lighting for selling is the electronic dimming apparatus. Applied to shop window lighting, in which light from fluorescent tubes in a changing sequence of colours is required, the apparatus automatically dims the lighting, selects the next colour in the sequence and brings it up to full brilliance.

Gent & Co., Ltd., Faraday Works, Leicester.—**Stand J17.**—A number of demonstration panels specially arranged to show the diversity and adaptability of the company's fire alarm systems are to be seen on this stand. Two new clock designs are available for either mains operation or master clock control. A comprehensive range of sound signals is shown.

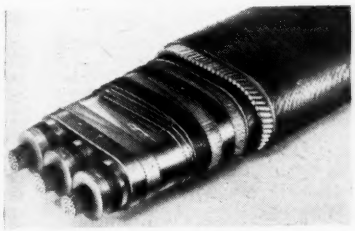
Gillott Electro Appliances, Ltd., Cotswold Works, Chalford, near Stroud, Glos.—**Stand L18.**—A range of space heaters includes the company's "Chalford" and "Gloucester" convectors and a de luxe model of the "Cotswold" fan heater with a two-speed motor and an indicator light to show when the element is in circuit. The "Duo-Coil" immersion heater has been redesigned.

Griffiths Bros. & Co., London, Ltd., Armour Works, Well Lane, Wednesfield, Staffs.—**Stand H30.**—A new product on view is "Ohmaline 82," an enveloping coat for the treatment of transformer coils and components of electronic equipment, to prevent mechanical damage and the ingress of moisture. Examples of insulating varnishes and compounds are shown.

Gulf Oil (Great Britain), Ltd., 6 & 7, Grosvenor Place, London, S.W.1.—**Stand F7.**—Insulating media include "Gulfsil" transformer and switch oils; insulating compounds; electric rotating machinery greases; time-lag dashpot oils.

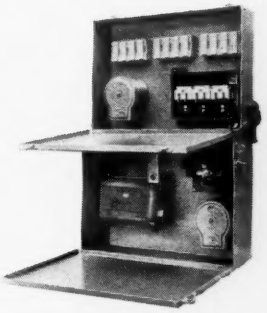
G.W.B. Furnaces, Ltd., Dibdale Works, Dudley.—**Stand G3.**—A selection of centralised multi-tier control panels, a stator-rotor starting panel for controlling seven 45 h.p. slip-ring induction motors, and an open type star/delta reversing contactor panel governing a 55 h.p. motor are among items displayed.

L. G. Hawkins & Co., Ltd., 30–35, Drury Lane, Kingsway, W.C.2.—**Stand J6.**—Among a range of fires and heaters, lamps, kettles, tea makers, food warmers

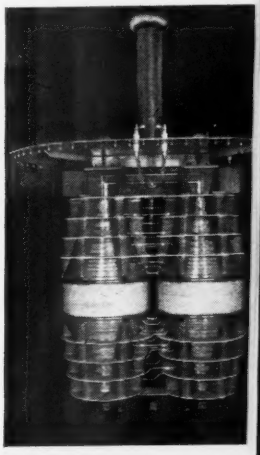


Cross-section of a 132 kV flat pressure submarine cable (Enfield Cables)

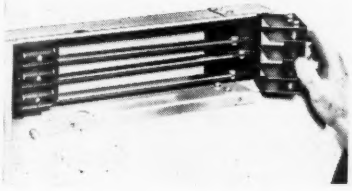
Ferranti lock wound core distribution transformer



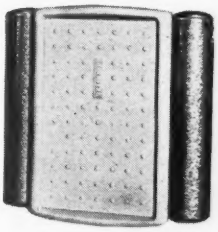
Engel & Gibbs off-peak tariff unit



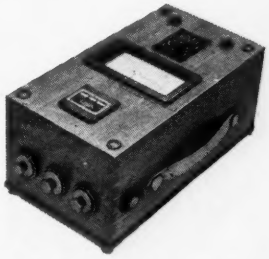
Foster 150 kVA 900/250 intermittently rated testi transformer



Section of E.M.S. Electrical Products "Plug Bus" channel with cover removed



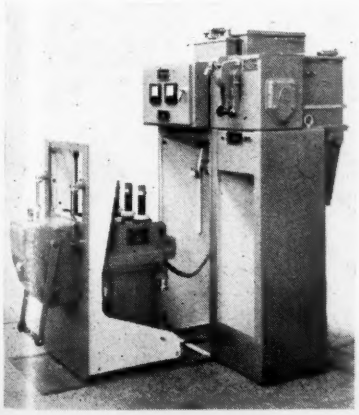
"Hi-Lo" door chime (V. & E. Friedland)

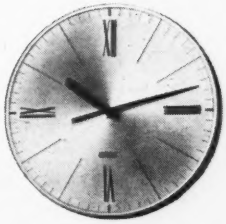


Eversheds & Vignoles series I mains operated "Megger" insulation tester

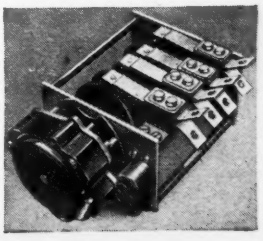
English Electric class "L switchgear: rear view of circu breaker truck with "Isolecto contacts in isolated positio

Ellison 11 kV circuit-breaker with isolating oil switch

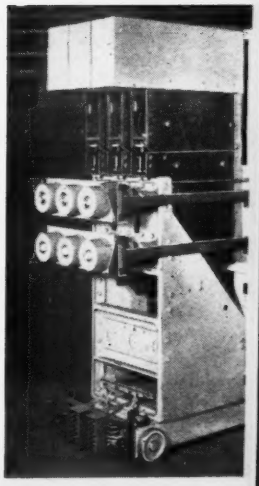




One of the newly-styled Gent clock faces



Right: Electrical Remote Control Co. type HCST timer



and other domestic electric equipment is a new enamelled "kitchen" kettle with a large spout for quick pouring.

Heatovent Electric, Ltd., Lomond Street, Glasgow, N.2.—**Stand K8.**—Space heaters for domestic and industrial purposes include metal convectors, "Tuvec" heaters, reflector heaters, and unit heaters from 3 kW upwards.

Heatrae, Ltd., Heatrae Works, Norwich.—**Stand M7.**—A wide range of heating apparatus for marine, industrial and commercial use includes the "Lido" water heater in 1½ and 3 gal sizes; cistern type water heaters; a range of immersion heaters; air warmers and hot water urns, all of which include flameproof types; flameproof thermostats and industrial hotplates.

F. C. Heayberd & Co., Ltd., Greenwich South Street, London, S.E.10.—**Stand O17.**—Examples of power transformers range from 8 VA to about 50 kVA and include models for l.v. lighting, etc. Also shown are battery chargers and rectifier units. The latter are now available with auto-transformers or with double-wound transformers and are made suitable for single- and three-phase inputs.

Hedin, Ltd., Commerce Estate, South Woodford, E.18.—**Stand M19.**—A new vertical loading furnace with self-contained automatic steam atmosphere container for bright annealing of non-ferrous metals, blueing of steel tools, etc., is shown.

Heenan & Froude, Ltd., Worcester.—**Stand M22.**—A demonstration unit shows the infinitely variable output speed range and ease of control of a coupling adapted as a brake and a torque limiting feature. A reeling drive unit is shown in operation and another unit demonstrates the absolute synchronising of two independent drives by electronic control.

W. T. Henley's Telegraph Works Co., Ltd., 51–53, Hatton Garden, London, E.C.1.—**Stand J13.**—Samples of both oil and gas type cables up to 132 kV are shown, together with mass impregnated types up to 33 kV. Fully-impregnated non-draining cables, aluminium sheathed and aluminium conductor cables are among the latest types displayed in addition to cables for power stations, distribution, mining and other industrial requirements. In the general purpose range plastic cables of every description are available for inspection, together with flexible cords, metallic flexible armoured cables, and winding wires.

Hirst Electronic Development, Ltd., Gatwick Road, Crawley.—**Stand H2.**—A new saturable reactor is shown in addition to welding machines up to 75 kVA, transformers, magnetic amplifiers, etc.

Hobourn Domestic Appliances, Ltd., Strood, Rochester, Kent.—**Stand H36.**—Electric convector heaters include nursery, wall mounting and portable types, all of which incorporate the patent "Hobourn" black heat element consisting of an electric cord, insulated with glass fibre, spaced over ceramic formers. Also on display is the "Ocean" oil-filled portable electric radiator and the "Hobourn" clothes dryer.

Holophane, Ltd., Elverton Street, London, S.W.1.—**Stand M14.**—Industrial prismatic lighting fittings include a new general purpose translucent range for medium interior mounting heights, in addition to well-established fittings for high and low bays with covered and translucent units, blended fittings and a heavy duty 1,000 W mercury discharge unit. Cast aluminium fittings are also on display with bulkhead, flameproof, vapour-proof and enclosed industrial pendants for specialised industrial applications. Commercial fittings include a new enclosed translucent unit for 300/500 W tungsten lamps.

Honeywell-Brown, Ltd., 1, Wadsworth Road, Perivale, Middlesex.—**Stand H8.**—On display in this country for the first time, this company's range of micro switches includes a sub-miniature switch claimed to be the smallest precision snap action switch yet developed, with a minimum mechanical life in excess of 1,000,000 operations.

Hoover, Ltd., Industrial Products Department, Cambuslang, Lanarkshire.—**Stand H7.**—A full range of the company's f.h.p. motors includes examples of its shaded pole motors and stator-rotor units. In addition there is shown an up-to-date range of moulded commutators. Induction type motors extend from $\frac{1}{8}$ to $\frac{1}{2}$ h.p., single-phase, and up to $\frac{3}{4}$ h.p. three-phase. Stator-rotor units for hermetic refrigeration range from $\frac{1}{12}$ to $\frac{1}{2}$ h.p., covering both split phase and capacitor start types.

V. G. Howell & Co., Ltd., Crown Street, Wolverhampton.—**Stand K4.**—Two new additions to this company's range of contactors include a Clapper HJS type for a.c. or d.c., available in 40/100/200/400/600 A sizes, either with or without blow-outs. The type HL range of air-break 3-phase contactor can be supplied for 15/25/50/75/100 and 200 A and is fitted with two sets of auxiliary contacts.

A. H. Hunt (Capacitors), Ltd., Bendon Valley, Garratt Lane, Wandsworth, London, S.W.18.—**Stand R8.**—Capacitors for radio, electronic, television and electrical industrial applications include phase splitting motor starting and running, p.f. improvement, fluorescent lighting, radio transmission, telephone installations, ignition and interference suppression types. Latest improvements include the use of "Aroclor" non-inflammable impregnant for p.f. improvement types; and production of larger types of p.f. improvement capacitors for operation up to 11 kV.

IBM United Kingdom, Ltd., Beavor Lane, London, W.6.—**Stand H33.**—The machines and systems exhibited include master clocks, job time recorders, programme machines for time control of electric circuits, relay cabinets, etc.

Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.1. — **Stand L21.** — The Nobel Division of this company displays new silicone rubbers of improved mechanical properties that operate efficiently at temperatures from −85 deg C to +250 deg C.

Jeary Electrical Co., Ltd., 132–142, East Road, London, N.1.—**Stand L13.**—Industrial electrical equipment includes propeller and axial flow fans from 9in to 36in, including flameproof types, and a range of geared f.h.p. motors.

Johnson & Phillips, Ltd., Charlton, London, S.E.7.—**Stand K13.**—This stand takes the form of a complete substation suitable for a medium sized factory and displays all the equipment required, including h.v. and l.v. switchgear, transformer, capacitors, and all the cabling.

Klaxon, Ltd., 49, Upper Brook Street, London, W.1.—**Stand J16.**—Motors from instrument types up to and including 1 h.p. and geared motor units.

Lancashire Dynamo & Crypto, Ltd., Trafford Park, Manchester, 17.—**Stand E8.**—In addition to a representative selection from the company's range of a.c. motors, a 250 h.p. mine haulage motor of the protected type fitted with flameproof slipring cover for operating on a 3·3 kV supply is exhibited. A 10 kW flameproof alternator (certified group 2 gases) as supplied for emergency use in oil refineries, etc., is also shown.

The Lancashire Dynamo Switchgear, Ltd., exhibit a new fuse distribution board from the "Oxted" range of boards. Made in sizes up to 12-ways, 100 A per way, these fuseboards are completely dust-tight and weatherproof and can be fitted with an incoming isolator.

Foster Transformers, Ltd., show a 250 kV, 150 kVA intermittently rated testing transformer together with its associated control unit by means of a life size photographic enlargement.

Laurence, Scott & Electromotors, Ltd., Gothic Works, Norwich.—**Stand N16.**—The N–S variable speed a.c. motor appears in a number of exhibits, and is shown in working demonstrations arranged for simple hand control of speed, with "Asrec" automatic control, and "Velonic" control. Static machine exhibits include an N–S variable speed motor (320/60 h.p., 660/370 r.p.m.) for a pumping station; an air-cooled induction regulator for a medium size N–S motor; and the stator of a totally-enclosed fan-cooled N–S variable speed motor.

Lewden Metal Products, Ltd., 5, Argall Avenue, Lea Bridge Factory Estate, Leyton, E.10.—**Stand K24.**—Weather-tight fittings include plugs and sockets in 5, 15 and 30 A sizes in all gauges and with 3 or 4 pins (also 5 pins in 15 A); cable couplings in all standard gauges, with 3, 4 or 5 pins and a full range of interlocking and non-interlocking switch plugs; surface-mounting and box or batten-mounting plugs and sockets; and 2-way adaptors and tee-couplings.

Light & Power Accessories Co., Ltd., Wellesley Works, Wellesley Road, Wood Green, N.22.—**Stand H3.**—Watertight plugs and sockets, switch sockets, switches, etc., covering all voltages in amperages from 2 to 500 are exhibited. New self-aligning spring loaded socket tubes that maintain contact at all times of the component's life are also displayed.

Line Equipment, Ltd., 32, Queen Victoria Street, London, E.C.4.—**Stand G15.**—Outdoor h.v. switch and fusegear includes rural type isolating switches, two- and three-insulator patterns, for 11 kV networks. The latest developments in spring and manual operating mechanisms, fault throwing switches, interrupter heads, standard and repeater fuse units are also shown.

Linolite, Ltd., 118, Baker Street, London, W.1.—**Stand M1.**—A picture lighting reflector with a new means of adjustment of the main beam of light is included in a wide range of decorative lighting fittings, strip reflectors, and signs.

Loblite, Ltd., Third Avenue, Team Valley, Gateshead-on-Tyne, 11.—**Stand P8.**—A complete industrial and farm wiring system incorporating watertight all-insulated and corrosion proof wellglass and bulkhead fittings is shown.

Londex, Ltd., Anerley Works, 207, Anerley Road, London, S.E.20.—**Stand B2.**—A full range of relays are shown as a working exhibit; types include multiple contact, mercury switch, midget, coaxial relays, etc. Timing apparatus is displayed for visitors to operate and photo-electric control equipment is again prominent. For the first time a unit incorporating

both projector and receiver circuits is on view; this is for use with extension heads, designed especially for installations where space is limited. The range of pressure and vacuum switches has been extended further to include two new types.

London Electric Wire Co. and Smiths, Ltd., 24, Queen Anne's Gate, London, S.W.1.—**Stand K12.**—This company and its associated companies, Frederick Smith & Co., Liverpool Electric Cable Co., Ltd., and Vactite Wire Co., Ltd., exhibit a comprehensive range of bare and insulated electrical conductors.

London Transformer Products, Ltd., Cobbold Estate, Willesden, London, N.W.10.—**Stand F1.**—Exhibits include power and distribution transformers; pole mounting units to T.1 specification, industrial transformers for electric furnaces, radar, radio transmission, signal and tunnel lighting units, and l.v. transformers for all purposes.

Lumitron, Ltd., 180, Shaftesbury Avenue, London, W.C.2.—**Stand N6.**—A new spotlight accessory has a polished anodised super-pure reflector in the four primary colours.

Arthur Lyon & Co. (Engineers), Ltd., 6, Carlos Place, Grosvenor Square, London, W.1.—**Stand O6.**—The company's main exhibit is a redesigned and improved "Stamford" magnetic amplifier alternator. All the control gear is now inside the machine itself.

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow.—**Stand G2.**—On this stand a selection of switch and control gear includes the "Unicube" type D464 m.v. group control motor starter assembly comprising a series of standard cubicle units built into board formation. Each unit is entirely self-contained and may accommodate four 35 h.p. direct-on starters; alternatively, two 35 h.p. and one 100 h.p.; two 100 h.p.; or one 300 h.p. starter.

William McGeoch & Co., Ltd., 46, Coventry Road, Birmingham, 10.—**Stand P3.**—A number of standard fittings have been improved and redesigned, and in this category are indicator light fittings and control panels, multi-pin pattern watertight sockets and plugs, etc. Also on view are open type knife switches to 10,000 A; fusegear to 400 A; brass lampholders; and Bakelite mouldings and stampings.

Robert Maclaren & Co., Ltd., Eglinton Works, Kilbirnie Street, Glasgow, C.5.—**Stand L9.**—A full range of Maclaren thermostats and control instruments is shown including the type "MB" water heating thermostat in which both adjustable and fixed setting types are available. Also displayed is a thermo-time regulator.

Major Equipment Co., Ltd., 22, Gorst Road, London, N.W.10.—**Stand G6.**—This company is showing a 12-way control panel for a saturable reactor dimmer board. Constructed in chassis form, it is capable of easy extension in both vertical and horizontal directions and can be either wall or desk mounted and circuits can be individually controlled or switched to a group master for collective dimming.

Mantel Metalworkers, Ltd., 121, Gurney Street, Walworth, London, S.E.17.—**Stand H13.**—This company shows "Zedlok" and "Springlok" cable trunking, underfloor trunking, etc.

Marbourn, Ltd., Roslyn Works, Roslyn Road, South Tottenham, N.15.—**Stand N7.**—In addition to a wide range of "Marbo" electrical accessories the company shows a new range of 5 A plaster-depth flush switch units.

Marryat & Place, Ltd., 40, Hatton Garden, London, E.C.1.—**Stand C13.**—The "Barduct" distribution system is shown complete with a full range of accessories. An interesting feature now in full scale production is "Barduct Powerlight." With this system, an addition is made to the standard trunk to form a continuous housing for fluorescent fittings.

Martindale Electric Co., Ltd., Westmorland Road, London, N.W.9.—**Stand M20.**—Exhibits include the "Vibrovertor" which enables cold cathode lighting to be used in vehicles from 24 V batteries; a taping machine; and a range of panels carrying blowers and heating attachments, etchers, dust masks and industrial gloves, "Commstones" and grinding tools, sprayers and undercutters and handpieces.

Max-Arc & Electrics, Ltd., Terrace Road, Walton-on-Thames, Surrey.—**Stand L4.**—On show is the new "Max Arclette" a.c. arc welding set which will weld any thickness of metal from light sheet steel trunking to heavy angle iron frames. The continuous rating is 3 kVA and maximum intermittent demand is 32 A at 220 V.

M.C.B. Co. (Manchester), Ltd., Lupus Works, Oxford Road, Altrincham, Cheshire.—**Stand H35.**—Exhibits include a complete range of "Lupus" miniature circuit-breakers from 2·5 to 60 A and a selection of distribution boxes from 1-way s.p. and n. to 12-way t.p. and n., as well as various types of laboratory control panels.

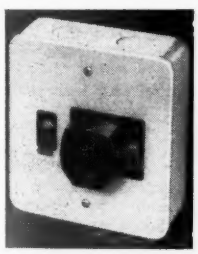
Measuring Instruments (Pullin), Ltd., Winchester Street, Acton, London, W.3.—**Stand J1.**—Examples of the new "Pullin" sealed relays, together with normal and weatherproofed versions of S-type relays, are displayed in addition to the first models of a new range of hermetically-sealed instruments. Switchboard and portable electrical measuring nstruments are also shown.

Merchant Adventurers, Ltd., 43, Portland Road, London, W.11.—**Stand A4.**—This company's stand is almost entirely devoted to showing the "Ventura 80" series of lighting fittings. The louvred diffuser, a translucent white opal plastic moulding, is completely non-static and is capable of withstanding more than double the actual operating temperature of the unit. The 12in diffuser can be positioned for use with 200, 150 or 100 W lamps.

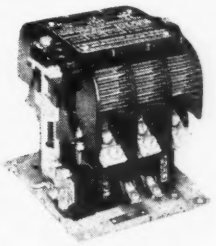
Metway Electrical Industries, Ltd., Canning Street, Kemp Town, Brighton, 7.—**Stand E5.**—There is a comprehensive display of domestic heating elements and spirals, industrial elements, etc., in addition to a range of electric kettles. Wiring accessories include such items as buckle cable clips, china connectors and "Scruit" connectors. Of special interest is the "Exaktway" 12-way flexible terminal block.

Micanite & Insulators Co., Ltd., Empire Works, Blackhorse Lane, Walthamstow, London, E.17.—**Stand M10.**—A wide range of electrical insulating materials of contrasting size includes a 275 kV bushing of the outdoor transformer re-entrant type as used on the C.E.A. supergrid and by contrast a display of bushings down to 6·6 kV. A "Paxolin" synthetic-resin bonded-paper laminated cylinder measuring 67in in diameter is exhibited beside some of the smallest made by the company.

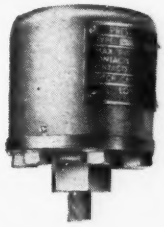
Midland Electric Manufacturing Co., Ltd., Tyseley, Birmingham, 11.—**Stand J10.**—Exhibits include a comprehensive range of switch, fuse and motor control gear; endurance testing apparatus and machines demonstrating the features of "Autoline" motor starters; and



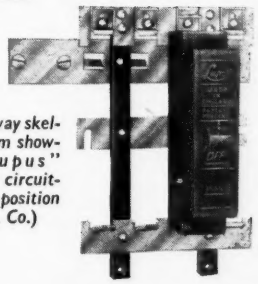
M.E.M. cooker control unit



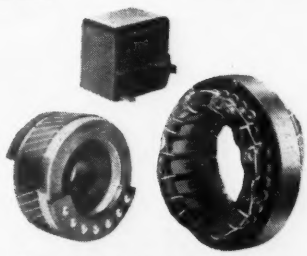
Howell type HL contactor



Londex miniature pressure switch

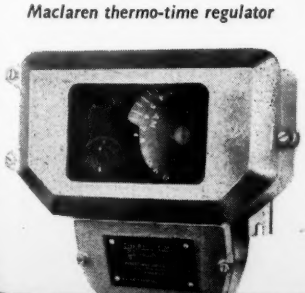


Right: 4-way skeleton system showing "Lupus" miniature circuit-breaker in position (M.C.B. Co.)

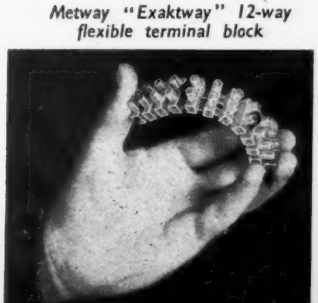


Hoover stator-rotor unit, with overload relay, for hermetic refrigeration

Maclaren thermo-time regulator



Metway "Exaktway" 12-way flexible terminal block



examples of the range of M.E.M. fires and convectors. New products introduced are a 2-gang flush socket outlet and a 30 A, 250 V cooker control unit to B.S. 1833.

J. H. Tucker & Co., Ltd., and the Kersons Manufacturing Co., Ltd. (subsidiaries of M.E.M.) exhibit a wide range of accessories on the same stand.

M.K. Electric, Ltd., Wakefield Street, Edmonton, London, N.18.—**Stand F4.**—A completely redesigned range of cooker control units are attractively styled to suit modern kitchens, and are completely interchangeable with the preceding range first marketed seven years ago. Also shown for the first time is a new range of switches designed for the control of water heaters and similar appliances.

Morphy-Richards, Ltd., 6, Conduit Street, London, W.1.—**Stand K3.**—New products shown are a console 2·3 cu ft "Astral" free-standing refrigerator and the single and double bed size electric blankets. Heaters, hair dryers, toasters, irons, door chimes and spin dryers complete the display.

Mycalex & T.I.M., Ltd., Ashcroft Road, Cirencester, Glos.—**Stand M25.**—The display of electric motors includes two shaded pole units, type MA, an offset shaded pole motor, and type MC, a barrel shaped motor which can also be supplied with a flange or foot mounting with a single or double shaft extension. Also on show are "Micatherm" arc shields made from compression moulded sheet. Users of test equipment will be interested in the quick-release spring loaded terminal.

Nalder Bros. & Thompson, Ltd., Dalston Lane Works, London, E.8.—**Stand H21.**—Products shown include ammeters, voltmeters, wattmeters, power factor meters, frequency meters; portable industrial and precision instruments for workshop and laboratory; graphic chart recording instruments; relays; and an earth proving supply point switch for use with portable electric tools.

Nettle Accessories, Ltd., Harper Road, Wythenshawe, Manchester, 22.—**Stand D3.**—A large selection of moulded electrical accessories includes 13 A ring main sockets, switched sockets, ceiling roses, e.s. and b.c. batten holders and lampholders, a.c. switches, architectural fittings, inspection handlamps, cable couplers and rubberclad sockets and plugs. New additions to the Nettle range are 13 A 3-pin rubberclad, fused and shuttered couplers, and sockets and plugs.

New Day Electrical Accessories, Ltd., 136–138, Mary Street, Balsall Heath, Birmingham, 12.—**Stand L18.**—Introduced for the first time is an entirely restyled range of accessories including a model showing the company's new pilot control unit. This is fitted with a small neon indicating light and 20 A d.p. switch.

Newman Industries, Ltd., Yate, Bristol.—**Stand H17.**—Exhibits range from ¼ h.p. "Elf" f.h.p. motors to 120 h.p. slip-ring motors and include those designed for specific duties such as flameproof, industrial, British Standard dimension, gasworks and pump motors. Particular emphasis is given to the company's range of flameproof motors.

Nife Batteries, Ltd., Redditch, Worcs.—**Stand H11.**—Focal point of this exhibit of steel-alkaline batteries of various types is a special display which demonstrates how a "Nife-Neverfayle" minor emergency lighting set will supply stand-by lighting in an operating theatre after a failure of the mains supply. There is also a "Nife-Neverfayle" major emergency lighting set which is capable of maintaining a 100 V load of 2·1 kW for three hours.

Otter Controls, Ltd., Otter's Ole, Buxton.—**Stand O5.**—Snap action thermostats and circuit-breakers are shown. New products are the "Motorguard," designed for internal fitting into f.h.p. single-phase motors, and the "Tubestat" control for immersion heaters.

Ottermill Switchgear, Ltd., 1, Victoria Street, London, S.W.1.—**Stand G8.**—Exhibits include industrial switchboards, oil circuit-breakers and busbar trunking. Separate lengths of 250 A trunking with various accessories, tapping boxes, incoming cable units, tees, bends, etc., are shown. The latest addition to the "Ottermill" range is 100 A miniature busbar trunking.

Parmiter, Hope & Sugden, Ltd., Longsight, Manchester, 12.—**Stand J7.**—A new range of power pillars, claimed to be revolutionary in the field of fuse-switch distribution boards, is shown. The general arrangement incorporates "Aeroflex" type FL fuse switch chassis, equipped with h.r.c. cartridge fuse links.

Parnall (Yate), Ltd., 255, North Circular Road, Neasden, London, N.W.10.—**Stand H34.**—A comprehensive range of home laundry appliances includes the models EW.50 and EW.50H electric washers.

Partridge, Wilson & Co., Ltd., Davenset Electrical Works, Evington Valley Road, Leicester.—**Stand B5.**—All types of rectifying equipment and transformers for industry are represented on this stand. Rectifiers as used for cathodic protection of buried metals and the starting of large aircraft engines are displayed together with samples from the "Davenset" transformer range, 5 VA to 500 kVA.

Permali, Ltd., Bristol Road, Gloucester.—**Stand K10.**—This company concentrate their display of "Permali" insulating materials on manufacturing processes and quality control. New exhibits include a range of "Dimex" insulators fitted with "Permali" cores, and "Permaglass" components made from glass fibre reinforced materials.

Permanoid, Ltd., New Islington, Manchester, 4.—**Stand O3.**—Light power flexibles include a full range of "Permathene" surface wiring cables to B.S. 1557 with diolpated p.v.c sheath for increased tensile strength and "Permanoid" VO flexibles, wires and sleevings for use in leads from motors and transformers and all electronic equipment.

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—**Stand E9.**—The Lamps & Lighting Section displays a full range of commercial and industrial fittings for use with its "gearless" fluorescent systems; a new range of display fittings; and a modern fluorescent lighting trunking system. New lamp developments include sodium lamps which have a light output at the end of life almost identical with their initial output; the 250 W MBF/U colour-corrected mercury-fluorescent lamp; a new 1,000 W quartz infra-red heater and a 4ft 40 W fluorescent lamp with an internal reflecting surface. The Industrial Section shows mercury-vapour rectifiers; a thermostatically controlled ignitron; a "Tempomat" electronic control unit, capable of controlling more than 180 different welding sequences; the PR.9151 roughness tester; a 6 kW h.f. generator; and an automatic temperature controller. The X-Ray Division shows two industrial X-ray units and an X-ray image amplifier.

Pirelli-General Cable Works, Ltd., Southampton.—**Stand M29.**—Self-supporting aerial cables; joints and fittings for use on pole and tower lines; and argon-arc welded corrugated aluminium sheathed oil-filled and supervisory cables are displayed.

Poles, Ltd., Tyburn Road, Erdington, Birmingham.—**Stand K11.**—"Adastra" galvanised tapering tubular sectional steel poles for overhead electric power lines, floodlight towers, etc., are shown.

Porter Electrical Products, Ltd., 2, North Park Road, Harrogate, Yorks.—**Stand B10.**—This stand, which concentrates on earthing equipment, shows in addition to the "Portaway" earthing conductors, a comprehensive range of bonding clamps. These include the T.O.C. and T.I.C. range for teeing off different sizes of conductors and for termination of the conductor on equipment being earthed.

Power Centre Co., Ltd., Lloyd Street, Wednesbury, Staffs.—**Stand K17.**—A comprehensive display of industrial electrical distribution gear comprises busbar trunking, cable-tap system, rising main systems, fuse units, fuseboards, switch-fuses, busbar chambers, switchboards, cable boxes and accessories. Among new products is a 100 A miniature plug-in pattern busbar trunking with all-insulated busbars, socket points at 2ft centres and for use in connection with 15 and 30 A fuse boxes.

Power Connectors, Ltd., 2, Caxton Street, Westminster, London, S.W.1.—**Stand H32.**—Numerous examples of connectors and fittings used in outdoor electrical substations and on overhead transmission lines are shown on this stand. Also exhibited are panel mounted samples of high tensile hardware in "PoCol" corrosion-resisting bronze alloy.

Process Control Gear, Ltd., 56, Victoria Street, St. Albans.—**Stand L5.**—A full range of "Proscon" domestic room thermostats is shown in addition to air stem types for the close control of temperature in greenhouses and frames, and a new "PS" domestic immersion thermostat of simplified design.

Pyrotenax, Ltd., 7, Victoria Street, London, S.W.1.—**Stand O12.**—Displayed here are mineral insulated cables for lighting purposes and heavy duty applications to large motors, cables for 3-phase and single-phase rising mains and laterals for blocks of flats, etc., pre-assembled cable units, thermo-electric cables and heating cables for radiant heating of buildings, pipe line tracing, de-icing, etc.

Rawlplug Co., Ltd., Rawlplug House, Cromwell Road, London, S.W.7.—**Stand K18.**—Fixing devices for all manner of electrical equipment include a range o "Durium" drills; the "Rawlbolt;" "Rawlnut;" and Rawlplug "Drill-Hammer" attachment.

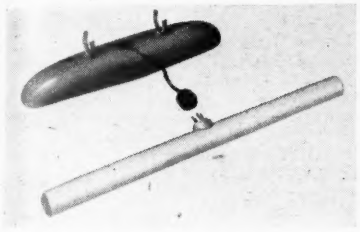
Record Electrical Co., Ltd., Broadheath, Altrincham, Cheshire.—**Stand H6.**—A large part of this stand is devoted to the company's "Cirscale" instruments, ranging from the 30in illuminated dial "Mammoth" to the 2¾in dial miniature, thus catering for every requirement. The company's range of graphic recorders includes the portable ammeter and clip-on transformer which won last year's award.

Revo Electric Co., Ltd., Tipton, Staffs.—**Stand F3.**—The range of products displayed comprise industrial and public lighting fittings, cookers and domestic appliances, electric fans and switchgear. Among industrial lighting fittings are a

Left : Siemens FTF.5742 decorative fluorescent fitting

Below : Santon "Otter" Mk IV immersion heater

Right : Power Connectors bi-metal expansion terminal



Herman Smith "Smithlite" centre-contact fluorescent lamp

Mycalex quick-release spring loaded terminal

dust-tight unit primarily designed for use in gasworks, a blended lighting unit suitable for use with one 250 W or 400 W mercury lamp and one 500 W or 750/1,000 W tungsten lamp, and a circular bulkhead fitting in die-cast aluminium for a 60 or 100 W lamp. The range of switch and fuse gear includes two new items, the "Silvertip" switchfuse and splitter switchfuse, and distribution boards suitable for rewirable or cartridge type fuses from 15 A 250 V to 200 A 500 V.

A. Reyrolle & Co., Ltd., Hebburn, Co. Durham.—**Stand H16.**—The main part of this company's display is a representative selection of their new class J range of rural switchgear units, comprising both extensible and non-extensible oil-switches and oil-immersed fuse-switches for 11 kV service. Also shown are a number of electrical accessories, including a wide variety of protected type industrial plugs and sockets.

Rheostatic Co., Ltd., Slough, Bucks.—**Stand C12.**—Prominent on this company's stand are the new "Satchwell VC" thermostats for electric water heaters and three new automatic controls for oil burners. Another of the exhibits is devoted to thermostats for electric cookers.

Rolls Switches, Ltd., 154–156, Blackfriars Road, London, S.E.1.—**Stand C14.**—In addition to 5 A round surface switches, flush switches, gang switches and plates and insulated patress blocks, there are several new items including a ceiling switch, 13 A safety socket, 13 A fused plug, universal wall and ceiling block and a hacksaw frame.

Ross, Courtney & Co., Ltd., Ashbrook Road, Upper Holloway, London, N.19.—**Stand L18.**—Wire end terminals, solder tags, pillar terminals, brass and copper cable sockets, brass and steel cable clips, copper clamp washers, spring clips, h.v. terminals, split and solid brass cable connectors, etc.

Rowlands Electrical Accessories, Ltd., R.E.A.L. Works, Hockley Hill, Birmingham, 18.—**Stand L20.**—Lighting fittings displayed include porcelain non-corrodible watertight fittings; non-corrodible ceiling fittings and watertight brackets; ceiling lights; industrial reflectors for gas-filled, m.v. and sodium lamps; shockproof handlamps; heavy-duty industrial lampholders; floodlanterns; "Realite" mirror line display lighting fittings; "R.E.A.L." plinth lights.

Wm. Sanders & Co. (Wednesbury), Ltd., Falcon Electrical Works, Wednesbury.—**Stand F2.**—Distribution fusegear and switchgear comprises a cubicle type ironclad switchboard, the "Sandaclad" range of fuse switches, fuse distribution boards and accessories, and h.r.c. fuse cartridges.

Sangamo Weston, Ltd., Great Cambridge Road, Enfield.—**Stand H10.**—Newer developments include various forms of the S.144 "Servo-Pot," a self-balancing potentiometer; and miniature hermetically sealed and "ruggedised" instruments in steel cases.

Joseph Sankey & Sons, Ltd., Bilston, Staffs.—**Stand E10.**—Electrical steel and laminations for the electrical industry include endplates, insulators, riveted and arc-welded cores and fields, aluminium die-cast rotors, inter-laminar insulation, etc. A new development of particular interest is the "D.R.N.S." form of inter-laminar insulation. It is a single-sided application resulting in a thickness of about 0·5 to 1/1,000in and is claimed to withstand annealing temperatures up to approximately 800 deg C.

Santon, Ltd., Somerton Works, Newport, Mon.—**Stand L12.**—The new "Otter" Mk IV immersion heater displayed embodies a number of advantages over previous models. Other exhibits comprise a full range of domestic and industrial immersion heaters, thermal storage heaters, rotary switches and control units, combination cylinder units and steam raisers.

George H. Scholes & Co., Ltd., Wylex Works, Wythenshawe, Manchester, 22.—**Stand D6.**—"Wylex" accessories include a dual plug system for ring main and non-ring main circuits, 20 A switches, pilot switches and clock connectors. Also on view are 5, 15 and 30 A switch fuse control units with rewirable and cartridge fuses assembled in any number of fuses up to 8-way, the "Extenso" system for extensions to existing fuse unit installations, "Wylex" and "Sonex" cooker control units, 30 and 60 A d.p. a.c. switches, and a 20 A t.p. 500 V isolator.

Scottish Cables, Ltd., Deanside, Renfrew.—**Stand B6.**—Exhibits range from large power cables to the smaller wiring cables and flexibles. In addition there are displays of aluminium conductor cables and joints.

Siemens Electric Lamps & Supplies, Ltd., 38–39, Upper Thames Street, London, E.C.4.—**Stand F6.**—Power and telephone cables, together with associated equipment, and samples of the latest types of rubber and plastic covered cable are exhibited by this company. The telephone section features a 25-line private telephone exchange and marine equipment is represented by a selection of ships' telegraph systems and a rudder indicator. L.v. distribution equipment includes earth leakage circuit-breaker devices, cut-outs and power fuse boxes, and consumers' service units. New products exhibited include "Wafer" type convector heaters and a range of tubular heaters. New lighting fittings of note are the FTF.5742—a decorative fluorescent lamp fitting utilising two, three, or four 5ft tubular lamps, a "slim-line" batten fitting and the "Congress" fluorescent lamp unit utilising twin 4ft tubular lamps.

Siemens-Schuckert (Great Britain), Ltd., Faraday Works, Great West Road, Brentford, Middlesex.—**Stand Q1.**—Industrial switchgear includes a newly designed s.p. 250 V circuit-breaker for maximum loading up to 30 A; flameproof equipment for Group I and II gases; a selection of industrial electric furnaces; and resistance welders of the spot, seam and projection types.

Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.—**Stand K16.**—New products shown include a range of dispersive reflectors, a corrosive resistant fluorescent fitting and the new "Screwglass" luminaires. The Flameproof Equipment Division is showing a new fluorescent unit, and from the Accessories Division there is a new range of 13 A socket outlets. "Creda" domestic products include the timer-controlled "Carefree" cooker.

Slough Metals, Ltd., Oxford Avenue Trading Estate, Slough, Bucks.—**Stand M8.**—Light metal castings for use in electrical equipment and fittings are shown here, an example being an "Atlas Alpha One" sodium lantern. The "opticell" and reflecting prisms of this highway lighting fitting are injection moulded from clear acrylic plastic and then fitted into aluminium alloy castings by the company.

Small Electric Motors, Ltd., Eagle Works, Churchfields Road, Beckenham, Kent.—**Stand L.11.**—A recently developed electronic dynamic balancing machine can be seen operating on the stand. Motor exhibits include single-phase, 3-phase and d.c. types, built to B.S., with drip-proof, screen protected and total enclosure; ⅛ to 2½ h.p. single-phase and ¼ to 10 h.p. 3-phase. Traction motors for battery operation with their associated controllers, aircraft generators and invertors, fan motors and motors with high safety factor for medical apparatus are also shown.

Herman Smith Smithlite, Ltd., Empire Works, Dudley, Worcs.—**Stand M11.**—A new range of fluorescent fittings and a complete range of contemporary

lighting fittings utilising the fluorescent lamp are displayed. The new "Smithlite" fluorescent lamp eliminates dark shadows in the ends of the fittings by dispensing with bi-pin or bayonet cap lamp ends—the leads from the electrodes are brought to a centre four-pin contact, and the lamp is simply inserted in the four-pin socket.

South Wales Switchgear, Ltd., Blackwood, Mon.—**Stand Q4.**—"T" type switch fusegear incorporating flush mounted instruments, distribution boards and contactors; newly introduced "R" type switch fusegear; C4X oil circuit-breaker suitable for 11 kV service up to 250 MVA; 33 kV air insulated outdoor metalclad unit of a certified rating up to 1,000 MVA; an extensible air insulated ring main unit; open type medium distribution switchboard; busbar trunking and distribution boxes.

Square D, Ltd., 100, Aldersgate Street, London, E.C.1.—**Stand J18.**—Exhibiting for the first time in Great Britain, the company's products include magnetic starters; multi-pole relays; remote control push-button stations; heavy duty and snap action limit switches; industrial pressure switches; pneumatic timing relays; thermal overload relays; and a new multi-purpose voltage tester.

Standard Telephones and Cables, Ltd., Connaught House, Aldwych, London, W.C.2.—**Stand F5.**—Power and communication cables; "Sentercel" rectifiers and equipment, including a new silicon rectifier transformer and a display of new series 400 selenium plates; selenium rectifiers and germanium devices; telephone cables and equipment; heat treatment equipment; fire alarms; "Stantelum" capacitors; "Stantel" thermistors; relays; quartz crystals; loudspeakers and microphones.

J. G. Statter & Co., Ltd., 82, Victoria Street, London, S.W.1.—**Stand M18.**—New products include an 11 kV metalclad air insulated drop-down drawout oil circuit-breaker; a new design of h.v. metalclad non-extensible ring main tee-off oil circuit-breaker; a non-automatic fault making load breaking oil switch; and a smaller size of h.r.c. air circuit-breaker rated at 600 A.

Sterling Cable Co., Ltd., Aldermaston, Berks.—**Stand L22.**—Cables incorporating copper and aluminium conductors insulated with rubber, p.v.c., polythene, butyl, paper and cambric; cables in single and multicore form; screened types having copper braid, copper tape, aluminium braid, aluminium tape and semi-conductive graphited tapes, sheathed with rubber, p.v.c., polythene, polychloroprene and lead. A special exhibit demonstrates the characteristics of radio frequency cables.

Sun Electrical Co., Ltd., 118–124, Charing Cross Road, London, W.C.2.—**Stand K19.**—Apparatus on view includes a hospital luminous call system; a visual staff locator system of 100 signals capacity; an entirely new interlocking terminal block system; time and delay switches; motors, 1/50 h.p. upwards, geared and ungeared; pumps for various applications, including small centrifugals in stainless steel; instruments, including a high current loop tester; ventilating fans and power tools; water heating, canteen equipment and a new design in infra-red space heating equipment; and a complete range of commercial and industrial electric clocks.

Sunvic Controls, Ltd., 10, Essex Street, Strand, London, W.C.2.—**Stand E7.**—Prominent is the "Simmerstat" regulator and the TQB water heater thermostat. Also on show is the TO oven thermostat and TQA standard water heater thermostat. The Industrial Division's exhibits include hotwire vacuum switches and relays for temperature control of industrial processes; energy regulators; adjustable bi-metal thermostats; glass sealed thermostats; high speed recorders; and time delay switches.

H. D. Symons & Co., Ltd., Park Works, Kingston Hill, Surrey.—**Stand E14.**—Flexible electrical insulating materials include varnished cotton, silk, nylon, glass and "Terylene." Slot insulating materials include "Emlin," "Duply" and "Symax." There is also a range of silicone elastomer products and a recent development is "Symel" silicone elastomer covered glass braid sleeving.

Synthetic Carbon & Engineering Co., Ltd., Cumberland Road, Stanmore, Middlesex.—**Stand N10.**—The display includes carbon brushes of all kinds, shapes, grades, and fittings, brush holders in all forms, copper gauze and laminated brushes, contact parts, controller fingers, contact tips in silver and copper, etc. A range of specially developed switch and fuse clips are also on view.

Tate Bros., Ltd., 2–8, Foredown Drive, Portslade, Sussex.—**Stand K1.**—The new "Minipressor" for jointing s.c.a. conductors from 0·02 to 0·175 copper equivalent and a range of cable cutters for stripping from 0·02 to 0·4 s.c.a. conductor prior to compression jointing are displayed. Also on show is the Mark II compressor and dies with a full range of fittings.

George E. Taylor & Co. (London), Ltd., 34, Southwark Bridge Road, London, S.E.1.—**Stand O7.**—Depicting the company's comprehensive consulting service to clients there are photographs of typical installations together with examples of workmanship.

Telegraph Condenser Co., Ltd., North Acton, London, W.3.—**Stand P6.**—The use of static condensers for power factor correction is demonstrated. In addition to examples of tank types fitted with oil circuit-breakers, pole mounting steel boxes and standardised units for mounting in banks, one model has a lightly loaded motor with appropriate meters showing volts, amps and power factor and a push-button switch brings into circuit for 30 sec a condenser correcting the p.f. to 0·95 and indicating a reduction in current and kVA.

Telegraph Construction & Maintenance Co., Ltd., Telcon Works, Greenwich, London, S.E.10.—**Stand D2.**—The latest developments in polythene insulated h.v. power cables for submarine installations and 11 kV three-core aerial types are displayed. Also shown is a standard range of "Telcon" p.i. power cables for voltages up to 22 kV with copper or aluminium conductors and lead or aluminium sheaths.

Tetra Engineering, Co., Ltd., 1–3, Redhill Street, London, N.W.1.—**Stand E3.**—On view are a few of the wide range of "Tetra" mineral embedded and tubular sheathed elements. Rod type elements are also shown.

Thermodare (Great Britain), 79–80, Petty France, London, S.W.1.—**Stand D7.**—The shelf fitting designed for "Thermodare" storage heaters, on show here, provides adequate protection for the heater and at the same time gives valuable additional shelf space.

Thorn Electrical Industries, Ltd., 105–109, Judd Street, London, W.C.1.—**Stand G9.**—Among lighting equipment is the new Atlas "Domino" fluorescent lighting system, and a new range of "Forrest" modern glassware. Cookers include the new Tricity "Trivet" grill boiler with specially designed grill pan and grid.

F. W. Thorpe, Ltd., Thorlux Works, Welby Road, Hall Green, Birmingham, 28.—**Stand M9.**—A complete range of fluorescent, tungsten and mercury industrial lighting fittings; fluorescent continuous trunking with detachable vitreous reflectors including the "Slydalong" system; and "Adjustafloods" floodlighting fittings, including one recently developed for 200/300 W lamps.

T.M.C. Harwell (Sales), Ltd., 37, Upper Berkeley Street, London, W.1.—**Stand M14A.**—In addition to the standard range of "Temco" wiring accessories, a new series of 13 A socket outlets are shown, together with a new ceiling switch embodying a hollow back to accommodate a heat resistant back plate.

Transformer & Electrical Co., Ltd., Eastern Road, Walthamstow, London, E.17.—**Stand P1.**—Various transformers from 15 VA to 25 kVA, air cooled and oil cooled, flashing testing sets, l.v. transformers for lighting and power, etc.

Troughton & Young, Ltd., Imperial Court, Basil Street, Knightsbridge, S.W.3.—**Stand L14.**—Displayed for the first time are two new products of their subsidiary company (Tyrad Electric, Ltd.), an electric floor heating system and a 1½ kW thermal storage space heater.

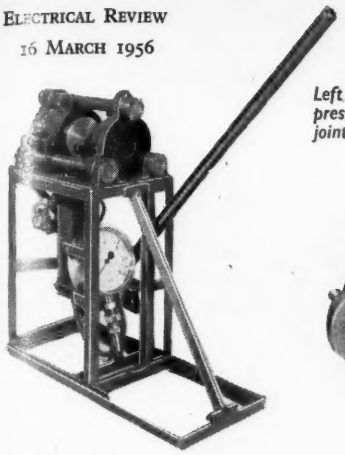
Tudor Accumulator Co., Ltd., 137, Victoria Street, London, S.W.1.—**Stand H14.**—A selection from the "Tudor" range of HPB high performance cells for use in power stations and substations and a representative group of stationary batteries used with "Safetylyte" equipment.

Tufnol, Ltd., Perry Barr, Birmingham, 22B.—**Stand G13.**—The interior of an "Ellison" 11 kV circuit-breaker showing "Tufnol" insulators is of special interest on this stand. The moulded ball, bell and barrel insulators on show are suitable for working voltages of up to 660 and possess tensile breaking stresses of up to approximately 8,000 lb. Other exhibits include bushes, fish plate insulators and spacers for insulating rail track circuit signalling systems, gear wheels and bearings for electrical equipment, fairleads and instrument panels.

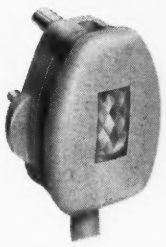
Turners Asbestos Cement Co., Ltd., Trafford Park, Manchester, 17.—**Stand N9.**—Exhibits include ebony grade "Sindanyo" electrical insulation boards, for panel and switchboard use; natural grade "Sindanyo" arc and heat resisting boards; "Siluminite" phenolic and melamine resin bonded products, using asbestos paper, felt or woven material as a base. Special attention has been paid to the development of asbestos based class H materials which include silicone resin bonded boards and impregnated paper and tubes capable of withstanding temperatures up to 200 deg C.

Varilectric, Ltd., 10, Melon Road, Peckham, London, S.E.15.—**Stand J15.**—Cubicle switchboards are shown in addition to units from a new range of contactors and combined fused switch motor starter units. Also displayed are distribution fuseboards, with and without built-in isolators; sections of rising main busbar trunking; and cable trunking.

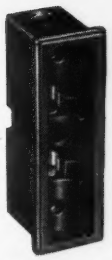
Varley Magnet Co., Cambridge Row, Woolwich, S.E.18.—**Stand A1.**—Completely new items shown on this stand are

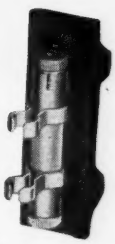


Left: Tate "Minipressor" compression jointer for s.c.a. conductors



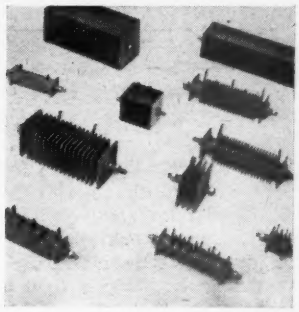
Walsall Conduits pilot light plug top





Holder and base of the "Slydlok" H-type 15 A fuse (Edward Wilcox)

Westinghouse new type lightweight high temperature rectifiers



the J.O4 relay, made by Besson & Robinson, Ltd., and the S.M. "O" miniature solenoid. A "Micafil" coil winding machine automatically winds coils with paper every layer of turns at high speeds.

Veritys, Ltd., Brettenham House, Lancaster Place, Strand, W.C.2.—**Stand L7.**—"Maxlume" products of interest to the lighting industry include a "Permaseal" unit particularly suitable for chemical or gas works, power stations, etc.; "Stayclean" fittings for areas where the atmosphere is very dirty; a "Quicklock" unit; flameproof equipment; general industrial fittings; and angle floodlights.

Victor Products (Wallsend), Ltd., Wallsend-on-Tyne, Northumberland.—**Stand M21.**—In addition to the latest model of the company's electric hammer drill there are Buxton certified weatherproof/flameproof lighting fittings and a range of non-flameproof watertight fittings.

Volex Electrical Products, Ltd., Salford, 6.—**Stand L24.**—A full range of electrical fittings, accessories, cables and flexibles are displayed on this company's stand. New lines include flush mounting plaster depth switches, 1-, 2- and 3-gang, 1- and 2-way; flush mounting and surface type socket outlets, 1- or 2-gang, 1- or 2-way; and a 5 A a.c. 1- and 2-way, d.p. ceiling switch. A range of l.v. terminal units includes adaptable desk types.

W. G. Walker & Co. (Engineers), Ltd., Emery Hill Street, London, S.W.1.—**Stand C3.**—The display comprises an overhead busbar system, incorporating take-off boxes, examples of cast fittings additional to and interchangeable with sheet steel trunking and accessories and tap-off boxes.

Walsall Conduits, Ltd., Excelsior Works, West Bromwich.—**Stand G14.**—New products include pilot light plugs in 5, 13 and 15 A sizes, all of which are fitted with a neon light and ruby plastic lens. A complete range of electrical equipment for dust-tight installations includes adaptable boxes, switch assemblies, push-button stations, fuseboards, cut-outs and bulkhead lighting fittings.

Walterisation Co., Ltd., Purley Way, Croydon, Surrey. — **Stand L10.** — This company displays several of its processes which have been adopted as corrosion protection treatments; also "Fasbond," a paint-bonding process which operates at low temperatures, and "Fasbond L.W.," which gives fine paint-bonding phosphate coatings with controlled coating weights.

Wandsworth Electrical Manufacturing Co., Ltd., 136, Cromwell Road, London, S.W.7.—**Stand H4.**—Exhibits cover a full range of electrical installation accessories including mercury switchgear for operating theatres. The "Bunnie" electrical incinerator is also shown. New equipment includes a new range of metal plates for decorative lighting; additions to a range of l.v. units; and the "Wemlock" cylinder lock and switchplug range.

Watford Electric & Manufacturing Co., Ltd., Abbey House, Victoria Street, London, S.W.1.—**Stand H24.**—A representative range of automatic airbreak control gear is exhibited, including high performance contactors with interrupting capacities beyond the performance required by B.S.775 : 1956, individual starters, control panels and starter switchboards. A complete 3·3 kV contactor cubicle capable of direct switching motors up to 1,000 h.p. is also shown.

Watliff Co., Ltd., Lombard Road, Morden Road, South Wimbledon, London, S.W.19. — **Stand K20.** — An exhaustive range of commutators and slip rings of built-up and moulded construction are shown. Commutators as used on all types of equipment, including automobile dynamos and starters, f.h.p. motors, generators, etc., are also displayed.

Westinghouse Brake & Signal Co., Ltd., 82, York Way, King's Cross, London, N.1.—**Stand C4.**—On display are specialised rectifier equipments. The battery charger section includes a sequence charger designed to charge two or more batteries successively; a charger for diesel locomotive batteries; and a battery charger developed for the Ministry of Supply. Various constant d.c. power supply equipments are on view, in addition to the HI.140 single-circuit rectifier developed to meet the requirements of new wide angle cinema projection techniques. Another exhibit is a constant current density controller for plating vats.

Westool, Ltd., St. Helen's Auckland Bishop Auckland. — **Stand N11.** — Displayed on this company's stand is a new 12-coil push-button automatic paper interleaving coil winding machine designed to accommodate 6in reels of wire with a winding range from 20 to 46 s.w.g. In addition, there are the recently introduced "Westair" climatiser and the "Westair" dehumidifier and "Warner" electric brakes and clutches.

Westwood Switchgear, Ltd., 22, Gorst Road, London, N.W.10.—**Stand G6.** — This company's unit assembly switchboards comprise a symmetrical assembly of standard size precision built units mounted on wall fixing framework or floor pedestals. Other products are dead front, flat back, cubicle and battery charging switchboards, feeder kiosks, heavy current plugs and sockets, knife switches, instrument switches and l.v. fuse units.

Whipp & Bourne, Ltd., Switchgear Works, Castleton, Rochdale, Lancs.—**Stand Q2.**—The company's a.c. industrial type switchboard is suitable for working on a 450 V 3-phase, 50 c/s system, and equipped with withdrawable pattern a.c. air-break circuit-breakers up to 1,600 A capacity. Also exhibited is a motor operated main exciter field rheostat arranged for working with a.v.r. equipment for turbo-alternators and a d.c. deadfront switchboard equipped with withdrawable d.c. circuit-breakers.

Henry Wiggin & Co., Ltd., Wiggin Street, Birmingham, 16.—**Stand B4.**—Applications of the "Brightray" series of electrical resistance alloys are shown in both domestic and industrial heating equipment. Among items seen are a small electric furnace and a turbo-prop engine cowling de-icer.

Edward Wilcox & Co., Ltd., Sharston Road, Wythenshawe, Manchester.—**Stand H25.**—The new "H" type fuse incorporates a unique form of rewirable fuselink, which, with an element of tinned copper fusewire, gives protection to a degree not previously achieved by semi-enclosed fuses.

Woden Transformer Co., Ltd., Moxley Road, Bilston, Staffs.—**Stand O11.**—Exhibited on this company's stand are 1,000 kVA distribution transformers and a range of pole mounting, low loss rural transformers from 5 kVA to 100 kVA. Also on show are 250 kVA arc furnace transformers with single-phase static balancing reactor; a 108 kVAr reactor; a 25 kVA rectifier transformer and special "C" core welding transformers.

Wolf Electric Tools, Ltd., Pioneer Works, Hanger Lane, London, W.5.—**Stand J14.**—Industrial and home craftsman portable electric tools on view include a new belt sanding attachment for the 6in high speed heavy duty grinder and the No. 11 flexible shaft set for grinding, sanding and polishing.

Woods of Colchester, Ltd., Colchester, Essex.—**Stand K9.**—In place of the conventional circular outlet baffles the re-styled "Xpelair" fan now has an outlet grille which is more compact and less conspicuous and the usual circular shape has been changed to a square with curved sides. A new model with a 6in diameter fan has also been introduced making a range of three sizes.

Yorkshire Switchgear & Engineering Co., Ltd., Meanwood, Leeds, 6.—**Stand P5.**—Typical of this company's products displayed here is a four panel 11 kV metaclad switchboard together with relay cabinets at the rear housing in addition telephones and batteries, all for outdoor service.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Ring Main Fusing

THE comments in your leaderette in the *Electrical Review* of 2nd March regarding ring main fusing are undoubtedly justified, but I would suggest that a very easy remedy could be applied by the manufacturers. Price speaks louder than anything when talking to the majority of electrical contractors, and if the manufacturers, instead of selling 3 A, 7 A and 13 A fused plug tops all at the same price, were to introduce a small price differential, making the 3 A plug the cheapest and the 13 A plug the dearest, I think that the bulk of the demand would very soon be for the 3 A plug, and the situation to which you refer would be rectified.

London, S.W.10. LESLIE MAYNARD.

Impedance Test Sets

I AM obliged to your correspondents Messrs. Jesty and Jennings for making useful contributions on the subject of installation testing (*Electrical Review*, 9th March) notwithstanding that each in turn appears to be somewhat biased, depending on their points of view. For instance, Mr. Jesty's suggestion that it is not lawful to connect the installation to the mains before a test for insulation is made and passed is not strictly correct. He must know, as well as I do, that Regulation 26 says that " The Undertakers shall not *permanently* connect an installation," etc., and that this permits temporary connections to be made for the purpose of testing, a practice which I suggest is widely employed, and as far as I am concerned personally a perfectly legitimate practice, as the " Undertakers " are themselves the testing authority.

Mr. Jesty also suggests that the value of loop impedance of underground systems in built-up areas is inherently low, but he does not qualify the expression. In point of fact the tests of modern installations coupled to systems such as are mentioned could on average reveal low values split more or less equally between the consumer's installation and the underground system. However, these low values of impedance are usually a substantial proportion of the " pass " figures recommended by the I.E.E. Regulations, and it is my opinion that they should be measured.

Mr. Jennings suggests that 3 A is perhaps too low a value for general use. I think I agree with him; indeed there is much to be said for incorporating a selector giving a range of currents. In my article I carefully made the point that the constants of the circuits, giving a current of 3 A, had been chosen for simplicity to assist the description, but this was followed immediately by the suggestion that users might prefer other values. The test set described would not increase in overall physical size if currents of up to 10 A were made available. Using a maximum current of 25 A the test set would have to be enlarged to 10in by 8in by 8in which is not, I suggest, excessively large.

Two other points remain, firstly the question of inaccuracy due to the power factor of the test circuit; in practice this is of a second order and in view of the probable inaccuracy due (*a*) to the errors in the choice of the " pass " values given by the designers of the I.E.E. Regulations, and (*b*) to the errors of the inspectors in interpreting the test results against the appropriate " pass " figures, I suggest that it should be completely disregarded.

The second point is the suggestion that the test set is over-complicated owing to certain features which have been incorporated in order to make it easy to read and foolproof to operate. This is not justified at all, in spite of the fact that the final circuit diagram includes a number of resistors, condensers and the like; it is very readily made up, using normal radio technique, and is toleranced so that sub-assembly testing in production is unnecessary. This equipment has been used since 1951 and there have been no failures in service.

Oxted. A. J. BAGGOTT.

Electrical Engineers Exhibition

WE are approaching the fifth Electrical Engineers Exhibition, essentially a trade exhibition.

Is it too much to hope that exhibitors will, this year, man their stands with staff capable of answering technical questions about the equipment exhibited?

Sevenoaks. H. KLINE.

B.I.F. Electrical Exhibitors

FIRST formed some years before the war, the B.I.F. Electrical Exhibitors' Committee has been largely responsible for the smooth running of the Electrical Section at Castle Bromwich. In view of the decision to move the Section to London it was felt that the exhibitors should be consulted on the future of the Committee. We are pleased to learn that as a result of the favourable replies received to a letter sent to them, and of a discussion which members of the Committee had with the British Electrical and Allied Manufacturers' Association, it has been agreed that the Committee shall continue to function and will look after the well-being of the B.E.A.M.A. and non-B.E.A.M.A. electrical exhibitors in Birmingham and London.

The firms represented on the Committee are the same as last year. The chairman is Mr. W. P. McGeoch (Wm. McGeoch & Co., Ltd.), the vice-chairman, Mr. H. H. Lusty (Bakelite, Ltd.) and the secretary is Mrs. H. W. Payne. Other representatives are: British Electrical Development Association (Mr. V. W. Dale); Brook Motors, Ltd. (Mr. T. Herd); Clang, Ltd. (Mr. E. Jones); English Electric Co., Ltd. (Mr. R. J. Day); General Electric Co., Ltd. (Mr. F. E. Lawrence); Higgs Motors, Ltd. (Mr. D. C. Y. Higgs); Midlands Electricity Board, Birmingham Sub-Area (Mr. J. R. Anderson); Permali, Ltd. (Mr. J. E. Swainson); Tufnol, Ltd. (Mr. S. H. Bailey); and the Westinghouse Brake & Signal Co., Ltd. (Mr. A. W. Hichisson).

B.E.A.M.A. Traction Course

Staff members of public transport undertakings last week took part in the second educational course arranged by the B.E.A.M.A. in conjunction with electric traction equipment manufacturers. The course included tours of three works in the north country, supplemented by lectures given by experts in the electric traction industry. The works visited were those of the English Electric Co., Ltd., Preston; British Insulated Callender's Cables, Ltd., Prescot; and the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park.

Ideal Home Exhibition

ELECTRICAL APPLIANCES IN COLOUR

AT the *Daily Mail* Ideal Home Exhibition, which is being held at Olympia, London, until the end of the month, the public is provided with one of the best opportunities of the year for viewing domestic electrical appliances. Practically every type of apparatus is represented and as far as the housewife is concerned " colour in the kitchen " might well be the theme of this year's display.

New ideas in construction, materials, fixtures and fittings are illustrated in the " House of the Future " where the intention is to present a probable design for living twenty-five years hence. Electricity from an atomic power station takes care of heating, air conditioning, water heating, cooking, refrigeration and home laundry. The old-fashioned vacuum cleaner is replaced by a portable electrostatic dust collector; a refrigerator is set at eye level among wall cupboards, with storage space in length rather than in depth; rubbish, including bones, is disposed of in the dish-washer; heating is basically floor heating, thermostatically controlled; and callers are admitted through an electrically operated front door. A telephone records messages from anyone who may call while the occupants are out.

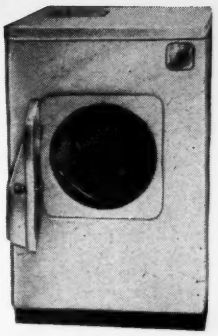
On Belling & Co.'s stand can be seen what is believed to be the first range of British electric cookers to be available in colour. In addition to the familiar white or cream, models are now offered in such attractive colour combinations as blue/white, blue/cream, green/white, green/cream, black/white and black/cream with, in some cases, the control knobs in red. Boldly styled, the 1956 range of Frigidaire refrigerators incorporates new ideas in storage and convenience and the models are available in radiant and pastel contemporary colour combinations, both inside and out. Prestcold's " New Look " D.361 3·6 cu ft model provides 48 different colour changes. With a cream or white cabinet one has a choice of six colour tops and four bases, all of which can be changed to match any later alteration to the kitchen colour scheme.

" Servis " washing machines have been re-styled and the larger cabinet model can now be had in jasmine, " stop " red, new blue and spring green shades. Easiclene Porcelain Enamel, Ltd., introduce full colour for their EW.2 and 3 models in a choice of red, light blue, cream or eau-de-nil. Similarly this company's EW.1 and 4 models are available in colour and their design lends them to a duo-tone finish. For the first time the Kenwood " Chef " and " Kenmix 55 " food mixers and " Steam-o-Matic " iron are available in an attractive colour range. There are eight basic colours to choose from for the food mixers and detachable plastic fittings can give a further five variations.

The growth of automatic cooking continues and one of the latest developments of the Jackson Electric Stove Co., Ltd., is an " Auto-control " panel. Single knob control gives a delay period of up to 14 hours and cooking time up to four hours. This panel can be supplied with the new " 390 " series or 192J/194J range of cookers, or to fit any existing models of these series. A feature of the new popular-priced cooker shown by the General Electric Co., Ltd., is that it makes for more room in the kitchen without sacrifice of cooking area. This is achieved by removal of the switch panel from the oven side to either side of the warming compartment. The finish is in white or honeysuckle. A similar finish is provided for the new G.E.C. 4 cu ft refrigerator, which is fitted with an interior light, door racks and a " turnaround " bottle shelf.

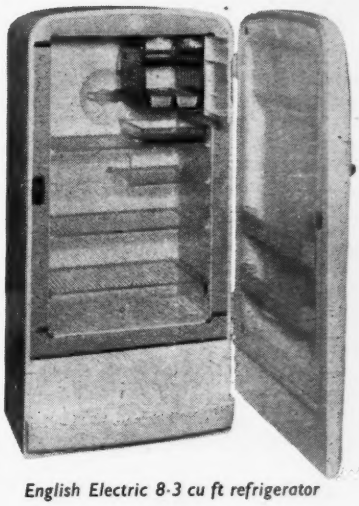
Cookers, however, need no longer be classed as strictly kitchen equipment. One of the latest from Tricity Cookers is a grill boiler designed for the lounge or bed-sitting room. When cooking is finished the top boiling plate is concealed by a drop-down cover, making it a pleasant centrepiece for flowers, etc. Aptly named the " Trivet," it is available in a wide range of two-tone finishes. Also suitable for the living room is the fully automatic, infra-red " Tudor " rotary spit shown by Brattel Electric, Ltd., which is able to boil, fry, grill, roast and toast at high speeds.

Laundry appliances include the new Ada (Halifax) tumbler dryer which is slightly smaller than the more conventional models, measuring 22in by 21in. Washers with power driven wringers, rotary and table ironers, etc., are to be seen on the Hotpoint stand. This company introduces a new portable rotary ironer, model PA, which is self-powered, the motor being incorporated inside the ironing drum. The shoe heat is thermostatically controlled and operation is by single lever control. Burco, Ltd., place emphasis on their " Baby Burco " 5 gal wash boiler which has only recently been introduced and another appliance of interest is their 122 boiler/washer, a new model of which has been produced with an automatic pump for easier emptying. Two new washing machines are included in the home laundry equipment shown by the English Electric Co., Ltd. Each has similar dimensions and a capacity of 10 gal of water and 8 lb dry clothes, a 12in power wringer and automatic draining pump. One also incorporates a 3 kW immersion heater and this model has in addition a timer control for the motor.

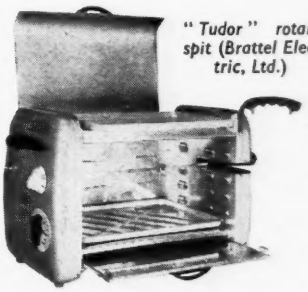


Ada tumbler dryer

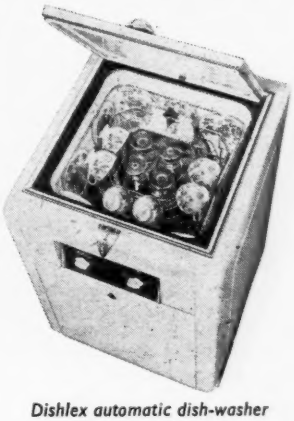
Right: " Prestcold " D.361 refrigerator



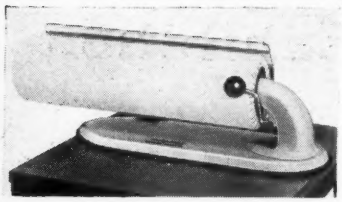
English Electric 8·3 cu ft refrigerator



" Tudor " rotary spit (Brattel Electric, Ltd.)



Dishlex automatic dish-washer



Above: Hotpoint PA portable rotary ironer

Left: Jackson auto-control panel shown fitted to one of the new "390" range of cookers

Serving the twin functions of home freezer and refrigerator, the new Kelvinator "Foodarama" has double door compartments; on one side it has a capacity of 11·2 cu ft for storing fresh foods and the other is a separately insulated upright freezer capable of storing 166 lb of frozen foods. Over 100 ice cubes can be made at a time. The Electrolux L.230 "Family Fridge" is shown in both white and cream and turquoise finishes and the new English Electric refrigerator with a capacity of 8·3 cu ft is in cream or white enamel finish with arctic green interior fittings.

A rotary drying machine, with an infra-red heating system and provision for airing clothes after ironing and folding, is shown by Oprim, Ltd., who also include in their display the "Super 22" portable rotary ironer and two industrial ironing machines. The latest Hoover cleaners are the recently introduced model 638, the "Junior" 119 and the new "Dustette" which is supplied with a strap enabling it to be slung over the shoulder. Several versions of the company's washing machine are available, including the Mark II with a heater, and the range of domestic appliances is completed with the "steam-or-dry" iron.

Visitors are given the opportunity of trying out the model 55 suction cleaner and the new type sprayer on the Electrolux stand. This sprayer differs from its predecessor in that it has only one jet, which can be manipulated to give the amount of flow required by simply revolving a nozzle. Tonewood Products have the "Balex" vacuum cleaner on their stand, the weight of the motor and housing of which is only 4½ lb. High suction power is one of its features and a hot air attachment for hair drying purposes is supplied with each cleaner.

Both the standard and the heated dish-washing machines are demonstrated by Dishmaster, Ltd., the latter incorporating a 3 gal hot water tank heated by a 2 kW element and thermostatically controlled. The company's "Wastemaster" garbage disposal unit is also shown. Another dish-washing machine which is fully automatic, heated and thermostatically controlled is shown by the Dishlex Division of Scotts Engineering (Newport), Ltd.

Besides the Sunbeam electric frypan introduced last autumn, the Sunbeam "Mixmaster" food mixer is also demonstrated. Paladin show their "Junior" and "Twin" food mixers, and the "Senior" with the latest P.23 gear attachment and cake mixing bowl which turns this model, as well as the "Twin," into a complete food mixer and liquidiser.

The new "Radisil" radiant heater, claimed to be one of the safest and most economical on the market, is shown by Hanovia. Three models are available at the moment, rated at 250, 500 and 750 W. A representative selection of their ultra-violet and infra-red lamps is also on view. Belling & Co. are exhibiting a range of convector heaters, suitable for wall fixing or free standing, attractively finished in two-tone bronze with warm-glow illumination in 1, 2 and 3 kW loadings, while Dimplex have added to their wide range of oil-filled radiators a miniature model for use as an airing cupboard heater, and to their colour range they have added light grey, a useful neutral shade for interior colour schemes. A number of Dimplex radiators are installed in the bungalows and show houses at the exhibition.

In the building sundries section Black & Decker exhibit a complete range of "Utility" portable electric tools for use around the home including two basic power units, together with accessories for screwdriving, sanding, polishing, buffing, grinding and paint mixing. The Wolf "Cub" home handyman portable electric drill together with a complete range of accessories is also on view, and new equipment includes the No. 11 flexible shaft set for intricate grinding, engraving, sanding and polishing. The E.D.A. stand has a special section devoted to contemporary lighting in which the newest fittings are shown, while the amateur gardener is not forgotten, electric soil warming and other applications being well represented.

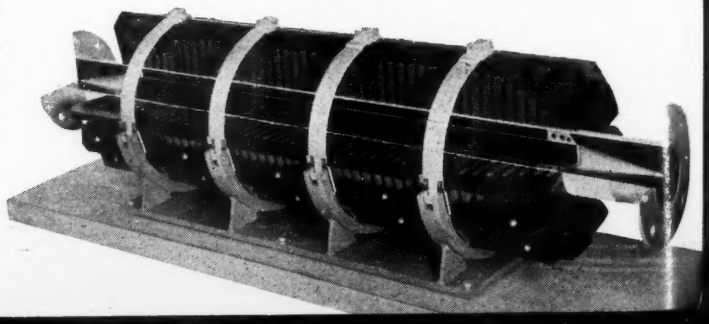
Liquid Metal Pumps for Nuclear Plants

MOUNTING activity in the field of nuclear energy is giving rise to secondary developments in a number of directions; one of these concerns the pumping of liquid metals used as carriers for heat energy generated within the nuclear reactor. The liquid metal, which is both radioactive and hot, can be pumped either mechanically or electromagnetically, and it is not yet certain which method will finally prevail. However, it is already clear that the electromagnetic pump has considerable advantages because of its simpler liquid circuit and absence of glands and of rotating parts.

In pumping electromagnetically, force is transmitted to the fluid by contriving that it passes through a magnetic field while carrying a current at right angles both to the field and to its direction of motion. There are two general methods of achieving this; in one, current is led from one outside conductor to another through the walls of a pipe and so through the liquid, and in the other the current is induced wholly within the liquid. Pumps using the first method (conduction pumps) fall into two categories; in one the pump operates with direct current and a fixed magnetic field, and in the other with a simultaneously alternating magnetic field and current.

For nuclear power plants a considerable flow of cooling liquids is required and here the pump is likely to be of the polyphase, travelling field induction type. An experimental pump of this sort developed and constructed in the British Thomson-Houston Research Laboratory is capable of pumping 400 gallons per minute against a pressure of 15 lb/sq in. The accompanying photograph of a full scale model of this pump shows clearly its internal construction.

Full-scale model of B.T.H. experimental pump of the polyphase, travelling field induction type



VIEWS on the NEWS

By REFLECTOR

A POINT of some importance to Electricity Boards generally has arisen at West Hartlepool. Requiring a supply for one of its schools, the Education Committee made application to the North Eastern Electricity Board. It was told that a capital contribution would be needed and also a building for use as a substation. It so happens that there is a distributing main near the school, although the Board says that it is not adequate to meet the supply. The Education Committee has been advised by the Town Clerk that under the Electric Lighting (Clauses) Act of 1899 the Board must supply electricity to the school and notice is to be served on the Board requiring it to do so. Section 27 of the Act, as amended, says:

> "An Area Board shall, upon being required to do so by the owner or occupier of any premises situate within fifty yards from any distributing main of the Area Board in which they are, for the time being, required to maintain or are maintaining a supply of energy for the purposes of general supply to private consumers under this Schedule or the Electricity regulations, give and continue to give a supply of energy to those premises in accordance with the provisions of this Schedule and of the said regulations, and they shall furnish and lay any electric lines that may be necessary for the purpose of supplying the maximum power with which any such owner or occupier is entitled to be supplied under this Schedule. . . ."

The supply is conditional upon the owner or occupier paying the cost of lines on his property and of any lines in excess of 60ft from the distributing main though not on his property. Also, the Board may require him to enter into a contract to receive and pay for a supply, for at least two years, equal to 20 per cent per annum of the outlay incurred by the Board in providing any lines required. The cost of mains reinforcement for an expanded supply to an existing consumer would be chargeable to him under Section 28 of the Act, but this presumably does not apply in this particular case.

* * *

This question of uneconomic supply extensions and the levying of capital contributions is frequently raised, particularly in rural areas. I was surprised to hear, however, at last week's meeting of the London Electricity Consultative Council, that supplies to most post-war housing estates in the London area have been provided at a loss. Mr. S. Morton Gore, the Board's secretary, told the Council that the legal requirements, based on the 1899 Act, were not in accordance with present day conditions and he understood that consultations were proceeding at the highest level, possibly with a view to the enactment of amending legislation.

* * *

Now on his way to Earls Court is a knight in armour riding a white horse. Leaving Wednesfield on Wednesday, he is expected to arrive on the opening day of the Electrical Engineers Exhibition after delivering goodwill messages to eight cities and towns on the 140-mile ride to London. This enterprising piece of publicity, I am told, has been arranged by the Wednesfield Urban District Council as a trade-mark-come-to-life of a local industry which is included in the exhibition. The trade mark is that of Griffiths Bros. Co., London, Ltd., whose Armour Works are at Wednesfield. The company is showing for the first time a new enveloping coat for the treatment of electrical equipment to prevent mechanical damage and keep out damp.

* * *

At an Electricity Consultative Council meeting of all places, I heard a member say last week that it cost twice as much to cook by electricity as by gas. Another member thought the reverse was the case. As very few people use both methods I can't see how it is possible for them to compare the two. But Aberdonians are not reputed to be spendthrifts, so when I read recently that last year 64 per cent of the Council's tenants chose to cook by electricity under the freedom-of-choice scheme I was convinced that I had not been wasting my money.

* * *

Steam stations were called upon to eke out Scotland's diminished hydro-electric supplies during last summer's drought. They are also helping in the development of future water power schemes, for ash from the South of Scotland Electricity Board's Braehead station, near Renfrew, is going into some of the dams being built in the north. A paragraph in the report of the North of Scotland Hydro-Electric Board says that at Lednock, near Comrie, fly ash is now being used in the concrete for the dam and up to the end of the year 16,000 cu yd of this kind of concrete had been placed. Fly ash, it explains, is a very finely divided silica which, because of its pozzolanic action with the lime set free when concrete sets, can be used to replace up to 30 per cent of the cement in a concrete mix. At Lednock and also in the Lubreoch dam a 20 per cent replacement has been adopted.

* * *

In view of this week's jubilee of the Batti-Wallahs' Society I was interested in the report of the Society's first luncheon published in the *Electrical Review* of 16th March, 1906. Explaining that the members were past and present men who, as electrical engineers with the Peninsular and Oriental Steamship Co. had been responsible for lighting the company's ships, the report proceeded in nautical vein

> ". . . one could hear the 'East a-callin', and go back to adventures with flying fish, and their accessories, to putting off in frail pilot boats, adventures that excited, dynamos that didn't, hurricanes in the Southern Seas, glimpses of Fugi-Yama, of the bush and the Veldt, for some or other of us had seen these things. When we splashed home through the muddy streets we heeded not because the tropic sun was warm overhead, and the temple bells were ringin' and so, as Pepys would say, to bed to dream ourselves back again on the Hoogly or the Irrawaddy, or passing through the Heads into Sydney, or moonlighting in Middle Harbour. . . ."

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The following changes have been made in representation on the **Electrical Fair Trading Council:**—Rubber and Thermoplastic Cable Manufacturers' Association: Mr. C. H. Broughton Pipkin (British Insulated Callender's Cables, Ltd.) has resigned and Mr. A. H. Carmichael (Cable Makers' Association) and Mr. F. E. Everard (Pirelli-General Cable Works, Ltd.) have been appointed. British Synchronous Clock Conference: Mr. S. M. Harris (T. M. C. Harwell (Sales), Ltd.) has resigned and Mr. F. W. Burgess (Synchronome Co., Ltd.) has been appointed.

At the annual meeting of the Batti-Wallahs' Society held on 6th March, **Mr. W. C. M. Couch,** C.B., C.B.E., M.I.E.E., Deputy Director of Electrical Engineering, Admiralty, was elected president of the Society for 1956-57. Mr. Couch was educated at the Mathematical School, Rochester, H.M. Dockyard School, Chatham, and the Royal Naval College, Greenwich, and received his training at H.M. Dockyard, Chatham. In 1918 he was appointed assistant electrical engineer in the Admiralty, becoming electrical engineer, Admiralty and Chatham Dockyard, in 1924. Nine years later he was appointed senior electrical engineer at Chatham, and in the following year (1937) became superintending electrical engineer at H.M. Dockyard, Malta. Later in the last mentioned year he was appointed Assistant Director of Electrical Engineering in the Admiralty, and took up his present position as Deputy Director in 1941. He was appointed a C.B.E. in 1946 and a C.B. in the 1956 New Year Honours.

Mr. W. C. M. Couch

Mr. W. J. Mackay, M.B.E., A.M.I.E.E., administrative officer at the Fife Area headquarters, Dunfermline, of the South of Scotland Electricity Board, retired on 29th February. Staff gifts (a wrist watch and a cigarette lighter) were presented to him by Mr. C. H. A. Collyns, M.I.E.E., area manager.

Mr. Walter H. Swain, who has been a director of Hirst, Ibbotson & Taylor, Ltd., since its formation, has decided to retire in the near future. Mr. Swain's services to the electrical trade through the Electrical Wholesalers' Federation are well known. To strengthen the board against the day of his retirement, **Mr. J. Brimelow** and **Mr. H. Barlow** have been made directors. Mr. Brimelow has been with the company all his business life, and for the past three years has been in charge of its Blackpool office. Mr. Barlow has been secretary of the company for the past three and a half years.

Lt.-Col. G. S. Marston, D.S.O., M.C., M.I.E.E., M.R.I., chairman of J. G. Statter & Co., Ltd., has returned from a world tour in which he visited electrical engineers and agents in Egypt, India, Pakistan, Africa, Australia and New Zealand.

Mr. G. H. Ross has been appointed manager of the Scottish branch office of Cantie Switches, Ltd., as from 1st April next. Mr. Ross, who was formerly with James Kilpatrick & Sons, Ltd., succeeds **Mr. T. C. Paton,** who has been representing Cantie Switches, Ltd., following his retirement last year from their associate company, Brookhirst Switchgear, Ltd., pending the appointment of a successor. The Scottish office of the company is at 248, West George Street, Glasgow, C.2 (telephone: Central 3739).

Mr. K. S. Estlin, O.B.E., M.C., T.D., Assoc.I.E.E., has been appointed cable sales manager of the Edison Swan Electric Co., Ltd. He was previously manager of the company's London district office. Mr. Estlin completed an apprenticeship course with the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park in 1930 and subsequently served on the staff of the Marine Department at the works and in the London district office until mobilisation in 1939. On release from the Forces, Mr. Estlin rejoined Metropolitan-Vickers and, following a refresher period at the works, was appointed manager of the Plymouth office. In 1949 he joined Uni-Gun Lubricating Equipment, Ltd., becoming managing director of that company in 1951, a position he vacated to join Ediswan in 1954.

Mr. K. S. Estlin

The Micanite & Insulators Co., Ltd., announces the appointment of **Mr. R. F. Archer,** B.Sc., as joint general manager. He will share managerial responsibilities with **Mr. H. A. Cooper,** F.C.I.S., director and general manager. Mr. Archer received his engineering training with the Metropolitan-Vickers Electrical Co., Ltd., Manchester, where he served a college apprenticeship before joining the staff of the Research Department. For the last ten years he has been leader of the process and insulation section of the Research Department, in which capacity he has been closely concerned with the development and application of new forms of electrical insulation. **Mr. A. N. Hawthorn,** A.R.I.C., and **Mr. J. P. Corkhill** have relinquished the positions of chief chemist and works superintendent, respectively, to become assistant works managers.

Mr. F. C. Edmondson, general manager and chief engineer of the Western Australian Electricity Commission, retired on 13th March.

Mr. J. A. MacKerrell has been appointed secretary of the East Midlands Electricity Board. He is a native of Greenock and it was during his service with the financial departments at Greenock, Ilford and Dundee that he made his first contacts with the electricity supply industry. In 1936 he was appointed secretary of the Institute of Municipal Treasurers and Accountants and acted as secretary of the Taxation Advisory Committee which represented the Supply Associations and the Central Electricity Board on all matters affecting taxation. Eight years later he became secretary of the Incorporated Association of Electric Power Companies and at vesting day was appointed secretary of Duncan Watson (Electrical Engineers), Ltd., one of the subsidiary companies in the Balfour Beatty Group.

Mr. J. A. MacKerrell

A general meeting of the **Lightmongers** was held on 7th March at the Cock Tavern, Fleet Street, London. In the chair was Mr. T. S. Jones, who was elected president last November. Over fifty members and their guests heard Mr. S. Anderson (General Electric Co., Ltd.) propose the toast of the guests, to which Mr. Charles Kent (Wardle Engineering Co., Ltd.) replied. The president, in response to the toast of the Society, stressed the friendship that existed amongst members of the lamp and lighting section of the industry. He referred to the retirement from the

Council of Mr. C. W. M. Phillips, and said that Mr. J. Woods (Venreco, Ltd.) had been co-opted to the Council in his place. On 6th June the Society was to hold its summer outing down the Thames by launch to "The Prospect of Whitby."

Mr. C. D. Palfreyman, A.M.I.E.E., has recently been appointed to an executive position in the Electrical Power Branch of the Snowy Mountains Hydro-Electric Authority and leaves for Australia in April to take up his new duties at Sydney. After serving an apprenticeship with the British Thomson-Houston Co., Ltd., at the Willesden Switchgear Works, he went to Rugby for a special training course, and on returning to Willesden in 1935 joined the Switchgear Engineering Department and was promoted to section engineer in 1937. Since then he has been responsible for the handling of many large contracts and, in the post-war reconstruction period, was concerned with the development of the B.T.H. semi-miniature type of station control equipment and apparatus. Mr. Palfreyman has visited Spain and Australia in connection with B.T.H. switchgear and generating plant for both hydro-electric and steam power stations.

Mr. C. D. Palfreyman

Two senior appointments are announced by Tallent (Aycliffe), Ltd., a member of the Charles Colston group. **Mr. C. E. Dawkins** is to take charge of the drawing offices. He was formerly with Block & Anderson, Ltd., office equipment manufacturers, and before that with Alvis, Ltd., the motor car manufacturers. **Mr. D. H. Rippin** has been appointed to supervise the design of electrical apparatus. Mr. Rippin joined Tallent (Aycliffe) from Westool, Ltd., and was formerly with Crompton Parkinson.

In last week's issue we reported the appointment of **Mr. R. W. Addie** as assistant commercial manager and **Mr. M. A. E. Butler** as technical-commercial manager of the Television and Radio Division of Philips Electrical, Ltd. We regret that the portraits of these two gentlemen were inadvertently transposed and now publish them in the correct order.

Mr. R. W. Addie

Mr. M. A. E. Butler

Mr. H. H. Corser has been elected chairman of the Southern Electric Authority of Queensland in succession to the late Mr. James Harvy Holmes, whose death we record in our Obituary section. Mr. Corser is a member of the legal firm of O'Shea, Corser & Wadley, of Brisbane. He was appointed to the board of the City Electric Light Co., Ltd., Brisbane, in 1941 and became a member of the Authority upon its inception in 1953. He is also a director of John Hicks & Co., Ltd., and of the London & Lancashire Insurance Co., Ltd.

Measuring Instruments (Pullin), Ltd., announce the appointment of **Mr. W. T. Shelton,** A.M.I.E.E., as chief development engineer at Electrin Works, Winchester Street, Acton, London, W.3. Mr. Shelton joined the company in January from the Rheostatic Co., Ltd. From 1949 to 1955 he was project engineer with S. Smith & Sons (England), Ltd. He received his technical education at the South East London and Hendon Technical Colleges, and during the war served with the Royal Fusiliers and R.E.M.E., for two years, being an instructor at the Telecommunication Engineering Wing, Arborfield.

Mr. W. T. Shelton

A social evening was held at the Harrow Inn, Abbey Wood, on 3rd March by some 250 workers and friends of **J. Day & Co. (Derby Works), Ltd.** The directors and several Ministry officials were present and in a speech the managing director (Mr. Sidney Day) referred to the progress of the company since its inception in 1900 and emphasised the appreciation of the directors of the loyalty shown by workers at all levels. He made special reference to the new £50,000 extension to the present factory at Abbey Wood, contracts for which were signed on 2nd March.

The annual presentation concert organised by the Social and Athletic Club of the **Telegraph Construction & Maintenance Co., Ltd.,** and **Submarine Cables, Ltd.,** was held in the canteen at Telcon Works, Greenwich, on 7th March. In addition to the presentation of trophies for the winners of the indoor and outdoor games, long service certificates were awarded to the staff who had completed 15 and 25 years' service, respectively, the latter also receiving a presentation clock. Recipients of the awards were introduced by Mr. W. R. J. Martin, personnel manager and chairman of the club's general purposes committee. The trophies and awards were presented by Mr. J. N. Dean, chairman of the company. Other directors present included Mr. B. H. Musgrave, Mr. W. F. Randall (managing director of the Telcon Metals Group) and Dr. E. W. Smith.

Speaking at the annual dinner-dance of the **Norfolk Electrical Development Circle** at Norwich on 7th March the Lord Mayor (Dr. Ian D. Dickson) made a plea that all electrical domestic equipment should be well designed and as fool-proof as possible. He was proposing the toast of "Success to the Circle," and asserted that there were more accidents to-day in the home than on the roads. Lately, he said, the position had improved but there were still too many accidents and still many electric fires in use that ought to be scrapped. The president of the Circle (Mr. J. A. Sumner, manager, Norfolk Sub-Area, Eastern Electricity Board) responded, and other speakers included Mr. D. E. Percival (city architect), Mrs. F. Corner (chairman of the Norwich E.C.A. Branch), Mr. W. H. Brown and Mr. A. J. Eagle.

E. N. Bray, Ltd., announce that following the resignation of Mr. E. E. Hopwood, **Mr. C. M. Sayer,** B.Sc. (Eng.), A.M.I.E.E., has been appointed managing director and chief engineer of the company. Mr. Sayer received his early training as a college apprentice with the Metropolitan-Vickers Electrical Co., Ltd., and has since specialised in the design and application of motor control gear. He was for fifteen years in the Industrial Control Engineering Department of Metropolitan-Vickers and held the position of assistant chief engineer from 1949 until he left to join the board of E. N. Bray, Ltd., in 1951. Mr. Sayer's principal technical assistant will be **Mr. J. E. N. McInnes,** B.Sc., A.M.I.E.E., who also was a college apprentice with Metropolitan-Vickers. During the war Mr. McInnes served as an electrical sub-lieutenant, R.N.V.R., in coastal mine sweepers. Returning to Metropolitan-Vickers he continued his training and was appointed to the staff of the Industrial Control Department. He later became a section leader in the General Engineering Department and was responsible for the co-ordination of several large industrial and marine electrical schemes.

Mr. C. M. Sayer

The Halifax Branch of the **Electrical Association for Women** celebrated its silver jubilee at a dinner on 20th February, when Mrs. Marjorie Fletcher (branch president and Mayoress) pre-

sided, and later cut the birthday cake. She was accompanied by the Mayor, Mr. J. Nicholl, J.P., who was one of the speakers. Other speakers were Mr. N. Ashton, district manager, Yorkshire Electricity Board; Mrs. A. R. Oates, branch chairman; Mrs. E. Lomas, area organiser; and two founder-members, Mrs. D. Johnson and Mrs. D. Stancliffe.

OBITUARY

Mr. J. H. Holmes.—The death occurred on 2nd March of Mr. James Harvy Holmes, chairman of the Southern Electric Authority of Queensland, Brisbane. His death breaks a continuous family association with the Authority and its predecessors since 1896. His father, the late Mr. E. J. Holmes, was one of the founders and first chairman of the City Electric Light Co., Ltd., Brisbane, when it was formed in 1904, and of its predecessor, Brisbane Electric Supply Co., Ltd., which was founded in 1896 to take over the first public electricity supply undertaking established in any British Dominion, by the firm of Barton, White & Co. Mr. J. H. Holmes was appointed a director of the City Electric Light Co., Ltd., upon his father's death in 1933 and five years later was elected chairman.

Mr. W. J. Oswald, A.M.I.E.E., who was to have retired from the South Eastern Electricity Board, of which he was a member, on 31st March, died on 9th March at the age of seventy-five. Mr. Oswald was educated at Battersea and Regent Street Polytechnics and received his training with James Simpson & Co., London. In 1899 he joined Robert Hammond & Son, consulting engineers, and in 1904 commenced his long association with the Wimbledon Corporation electricity undertaking which he joined as engineer-in-charge. He was appointed deputy chief engineer and manager of the undertaking in 1912, a position he held until his retirement in 1946. He was a past-president of the E.P.E.A., a member of the N.E.C. for thirty-two years, and for over twenty years national treasurer, chairman of the Finance Committee and chairman of the Legal and Parliamentary Committee.

The late Mr. W. J. Oswald

Mr. A. D. Newbury.—The death occurred on 5th March at Marlow of Mr. Alfred Donald Newbury, M.I.E.E.

Mr. John Altman, founder and chairman of the Wholesale Fittings Co., Ltd., died on 5th March at the age of eighty-five.

WILLS

Mr. F. W. Purse, M.I.E.E., M.I.Mech.E., formerly chief engineer of the London and Home Counties Joint Electricity Authority, who died on 24th November last, left £9,830 gross (£9,651 net).

Sir Samuel Turner, LL.D., J.P., former chairman of Turner & Newall, Ltd., who died on 23rd December last, left £1,108,606 gross (£1,075,067 net).

Mr. P. W. Petter, who with his twin brother, the late Sir Ernest Petter, started Petters, Ltd., left £23,502 gross (£14,198 net).

Restrictive Trade Practices Bill

WHEN Mr. Peter Thorneycroft, the President of the Board of Trade, submitted the Restrictive Trade Practices Bill to the House of Commons for its second reading, he announced that, because much of the work of the Monopolies Commission would be covered by the arrangements under the Bill, some of the inquiries being undertaken by the Commission would be ended.

The current inquiries which were nearing completion would be finished and the reports of the Monopolies Commission would be published. These included heavy electrical plant.

He proposed to withdraw the references which were not near completion relating to electric batteries, street lighting equipment, steel frames for buildings, common prices and agreed tendering. Price rings were earmarked for comprehensive and early registration under the provisions of the Bill. He contemplated converting the reference relating to electronic valves into a factual reference. He did not propose to make governmental decisions on matters which were now being made justiciable. The two matters with which the Commission might be concerned in future would be single-firm monopolies and agreements relating exclusively to exports.

He said that although there were respectable arguments in favour of resale price maintenance, the collective enforcement of resale prices greatly exacerbated any evils which might flow from it.

Mr. Douglas Jay, leading the Opposition's attack, said it would be 100 years before all the restrictive practices were dealt with by the court. The Monopolies Commission had recommended that collective boycotts, exclusive dealing and collective resale price maintenance should be prohibited by law, provision being made for exceptions.

An American clock firm which, with the help of the Board of Trade, had built up production in Scotland, objected in principle to joining an association operating in restraint of trade. The firm, in a letter, said that the Synchronous Clock Conference had sent a circular to all the principal electrical wholesalers reminding them that if they dared to handle the products of a non-member all manufacturers who were members of the conference would be obliged to deny them their products. There was no certainty that such action would be prevented by this Bill for many years, if ever.

Mr. W. E. Padley said that the procedure outlined for the individual enforcement of price maintenance by legal proceedings, contained in Clause 20 of the Bill, required some measure of supervision. Industries where there was a considerable monopoly had much of the power contained in the Clause under patent licences.

There was the interesting report of the Commission on electric lamps. They came to the conclusion that, on balance, the E.L.M.A. ring served the public interest and recommended the continuance, subject to public control, of the common price system. The Commission had argued in this case that the advantages of the pooling of patents, the exchange of technical information and so on, were more important than the disadvantages attaching to the practice.

Sir L. Joynson-Hicks said that the alternative which the Opposition would put forward would make these restrictive practices criminal offences and the country did not want that to happen.

Mr. Ted Leather did not believe that British industry was so weak or inexperienced that, where Canadians and Americans could survive in a more competitive atmosphere, our industry would be wiped out or become profitless, with mass unemployment.

Mr. Derek Walker-Smith, Parliamentary Secretary, Board of Trade, replying to the debate, said that the reason why it was impossible to enforce individual resale price maintenance in the courts, now, was that the manufacturer could only sue the immediate purchaser of his product, the one with whom he was in direct contractual relationship. But there were many cases of one or more parties intervening between that sale and the ultimate retail disposal. All the Government sought to do in Clause 20 was to assimilate the general law and to make the price run with the goods.

There would be no delay in the Government's method of dealing with restrictive practices, he said. It was hoped to get common prices, level tendering and collective legislation registered within about three months of the Order being made.

The Bill was approved by 319 votes to 252.

PARLIAMENTARY REPORT

Wages in Nationalised Industries

Mr. Gresham Cooke asked the Prime Minister whether he would now call a conference of the heads of the nationalised boards, to be presided over by himself, with a view to obtaining agreement on a common wage policy to be followed by all nationalised industries, both during the present phase of economic restraint and subsequently.

Sir Anthony Eden said that the nationalised industries, like other industries, were responsible for dealing with their own wages questions. It was, however, of the greatest importance that all concerned with these questions should exercise their responsibility with a full knowledge of economic considerations affecting the national interest. That was one of the reasons why, with his colleagues, he was having meetings with representative leaders of industry.

In reply to Mr. Ridsdale, the Chancellor of the Exchequer (Mr. Harold Macmillan) said that total wages and salaries paid by all the public corporations increased from £1,018 million in 1951 to £1,201 in 1954, a rise of 18 per cent. No statistics of the volume of output of the public corporations as a whole were compiled. Between 1951 and 1954 output of electricity rose by 22 per cent, of gas by 3 per cent and of coal by 0·5 per cent. As a result of nationalisation and denationalisation the number and size of operating units within the public corporations sector changed from year to year.

The Minister of Labour (Mr. Iain Macleod) told Mr. Ridsdale that between April, 1951, and April, 1955, average weekly earnings of manual wage-earners in the electricity industry rose by about 37 per cent. Between the third quarter of 1951 and the third quarter of 1955 the average weekly cash earnings of all wage-earners in the nationalised coal mining industry rose by about 29 per cent.

New Supplies and Hire Schemes

Lieutenant-Colonel Lipton asked the Minister of Fuel and Power how the reduction in the capital investment programme of the Central Electricity Authority would affect provision for new consumers and hiring of electrical appliances.

Mr. David Renton, Parliamentary Secretary, said the Minister had already told the House that only half the total reduction would fall on distribution. In turn, only a part of this amount would affect new supplies. There might, however, be some slight delay in connecting prospective consumers. The Boards had agreed not to buy additional apparatus for hiring and the programme therefore made no provision for new expenditure under this head; but apparatus at present on hire was not affected and when given up by its present users could be re-hired.

Commonwealth and Nuclear Energy

Mr. Beswick asked the Under-Secretary of State for Commonwealth Relations what discussions he had had with member nations of the Commonwealth about the possibility of a joint project for the production of nuclear materials and energy, along the lines of Euratom.

Commander Noble, Under-Secretary, Colonial Office, said that co-operation with members of the Commonwealth in atomic matters was close and continuous and had, he believed, been of great benefit to all concerned. The wide dispersion of the Commonwealth, however, would preclude any scheme on the lines suggested.

Railway Electrification System

The Minister of Transport and Civil Aviation (Mr. Watkinson) informed Mr. Geoffrey Wilson that he was carefully and urgently studying the British Transport Commission's proposal to adopt the 25 kV 50 c/s system for future railway electrification. Meanwhile it would be premature for him to commit himself to final and formal approval, but he wished to express his warm appreciation of the bold and imaginative technical decision which the Commission had reached on this most important matter and his hope that, in the words of the Commission's report, it would be proved "to have anticipated the needs of the new railway era."

Redundancy in Radio Industry

Mr. Hunter asked the Minister if he would watch carefully the position in the radio industry in which there were signs of a great slump developing, similar to that in the motor-car industry, and Mr. Skeffington referred to a threat of redundancy involving some 1,800 workers at the E.M.I. factory at Hayes.

Mr. Macleod said that if redundancy involved registering at the employment exchanges all the services of the Ministry were available to the workers. Although one read of considerable redundancies, not a very large proportion of the people affected registered at the exchanges. The number of vacancies in the country was still much greater than the number of unemployed.

A Cardiff Factory

In reply to Mr. George Thomas, the Minister of Labour (Mr. Macleod) said that four men and 21 women discharged by the Hopkinson Electric Co. were registered as unemployed at the Cardiff Employment Exchange on 1st March. Over 200 workers had already accepted employment with the new tenant of the factory. Of those looking for work the Exchange had placed 22 and would endeavour to place other redundant workers in alternative employment.

Exports to Eastern Europe

Mr. Swingler asked the President of the Board of Trade if his attention had been drawn to the fact that whereas West German exports to Eastern Europe rose in value from £10 million to £17 million, comparing the first half of 1955 with the first half of 1954, British exports to Eastern Europe dropped from £6·8 million to £6·4 million in the same period.

Mr. Low, Minister of State, said his information was that our own exports to the Soviet bloc countries, other than the U.S.S.R. itself, amounted to £6·1 million in the first half of 1954 and £6·5 million in the first half of 1955. The Board of Trade took every opportunity, by the negotiation of trade agreements and in other ways, to afford to exporters every help in these difficult markets.

Radio Imports

The President of the Board of Trade (Mr. Thorneycroft) informed Capt. Pilkington that 7,872 complete radio sets were imported from Germany in 1954 and 27,073 in 1955. Figures for complete radiogramophones were 143 and 1,219.

Capt. Pilkington asked if the President had received any representations from the makers in this country in view of the tremendous increase over the last year.

Mr. Thorneycroft said he did not think so. The tariff was, in fact, the same—20 per cent—in both countries.

Broadcasting Services

In reply to Mr. Freeth, the Postmaster-General (Dr. Hill) said that in the case of both the B.B.C. and the I.T.A. the cut in capital investment was of the order of 20 per cent on the original estimates for 1956-57. The general effect in both cases would be a slowing down of the process of extending and improving existing services. The details were now being worked out by the two bodies. On the question of the applications from the B.B.C. and the I.T.A. for consent to provide a second television programme, the Government had decided to defer consideration of any such additional television programme for two years. It should be possible by then to make a better assessment of the influence of current technical developments, including colour.

INDUSTRIAL NEWS

Electrical Contracting Wages

The increase of 4d per hour in the electrical contracting industry, agreed by the E.T.U. and the N.F.E.A. and operative as from 26th March, results in the following hourly rates:—Journeymen electricians: London area 4s 9½d; Mersey district 4s 7½d; other districts 4s 4½d. Adult mates: London 3s 11¾d; Mersey district 3s 8d; Bristol 3s 7¾d; other districts 3s 5¾d.

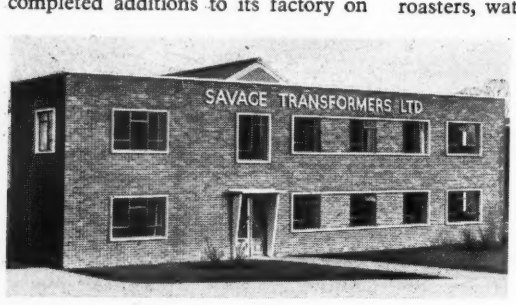
Category 1 and 2 apprentices			
Age	**London**	**Mersey**	**Elsewhere**
	s d	s d	s d
15	11½	11	10½
16	1 2½	1 2	1 1¼
17	1 5¼	1 4¾	1 3¾
18	2 2	2 1	1 11¾
19	2 7¾	2 6½	2 5
20	3 4¼	3 2¾	3 0¾
Labour under 21			
19	2 7¾	2 6½	2 5
20	3 4¼	3 2¾	3 0¾

Cable Contract from Brazil

The Comissao Estadual de Energia Eletrica of Rio Grande do Sul, Brazil, has placed a further order valued at more than £140,000 sterling with British Insulated Callender's Cables, Ltd., for 22 km of 69 kV electric cable. This is needed as part of the programme for linking up substations in the suburban areas of the city of Porto Alegre by means of underground cables. In 1954 British Insulated Callender's Cables supplied an identical cable for the underground continuation of the transmission line from Sao Jeronimo power station to the substation in Porto Alegre. This cable was laid and jointed under the supervision of the British Insulated Callender's Construction Co., Ltd., and went into commission last year. This second cable will link the substations of Passo da Areia, Navegantes and Ave Cascata.

Transformer Company's Extension

Savage (Transformers), Ltd., has completed additions to its factory on the Wiltshire Downs at Devizes. A complete new block has been built, incorporating a suite of offices with modern aids for design, administrative and clerical efficiency. The new building has released a substantial portion of the works area for greater production.



The new extension of Savage (Transformers), Ltd., Devizes

Spanish Hydro-Electric Station

The English Electric Co., Ltd., has received an order from Electra de Viesgo S.A. of Santander for a 35 MVA water turbo-alternator. The output will feed the industrial areas in Asturias and further east. The new power station will utilise the existing dam at Doiras where a power station of this name has been in existence since 1934. The new Silvon station will, however, be on the opposite bank of the River Navia immediately downstream of the dam.

Silvon is some 29 km from the coast and 25 km downstream of Salime power station, the machinery for which was also supplied by the English Electric Company and which was officially inaugurated by General Franco in August, 1955.

The turbine ordered is of the vertical Francis type working with a flow of 50 m^3/sec, the maximum net head being 75 metres. At this head the turbine is designed to give 44,750 h.p. at 250 r.p.m. The alternator is of the umbrella type with the combined thrust and guide bearing below the rotor. It will have an output of 35 MVA at 0·9 power factor and will generate at 11 kV.

Catering Equipment Exhibition

On 6th March a commercial catering equipment exhibition, organised by the Bristol Central District of the South Western Electricity Board, was opened at Electricity House, Bristol. The exhibition, which has been arranged to publicise the introduction of a special rate of 1¼d per kWh for electricity used in commercial cooking and food preparation, is the first of its kind to be held in the South-West, and the equipment displayed includes dish-washing machines, refrigerators, roasters, water-boilers, potato peelers, infra-red grills, laundry equipment, grills, slicing machines, and other equipment. The exhibition is intended to appeal primarily to a wide range of caterers, from the small boarding house proprietor to the largest hotel, school and industrial kitchens, and works canteens. Competitions have been held in which apprentices and student chefs have been taking part, and there have also been classes in the domestic science section for students from schools in the area. At a Press conference held before the opening of the exhibition, Mr. A. G. Parsons, manager of the Bristol Central District of the Board, emphasised the importance of hygiene in the kitchen and said that electricity could go a long way towards eliminating germs and ensuring high standards in hotels, restaurants and canteens. The exhibition closes to-morrow (Saturday).

Siemens-Ediswan, Ltd.

In our issue of 27th January we reported the formation of a new company, Siemens-Ediswan, Ltd. The new company is the fusion of interests of Siemens Bros. & Co., Ltd., with those of the Edison Swan Electric Co., Ltd. Whilst the production of the various commodities is being integrated, the marketing arrangements will be such that both Siemens Bros. and Ediswan will continue to trade as independent concerns. Both companies are part of the A.E.I. organisation.

Senior sales executives of both the Siemens and Ediswan organisations were present at a conference on 27th February, at the Charing Cross Hotel, the purpose of which was to make known and discuss details of the co-ordination of sales policy to be adopted by the Siemens-Ediswan group. The conference was addressed by General Sir William Morgan, chairman of Siemens Bros. & Co., and also of the new company, and a comprehensive statement was made by Dr. J. N. Aldington, managing director of Siemens-Ediswan, Ltd., who presided. In his address Dr. Aldington emphasised that, whereas a strong policy of co-ordination would in future be brought to bear on all matters relating to research, development, manufacture and distribution of the many products of the group, the names of "Siemens" and "Ediswan" would continue to enjoy their separate identities.

London Airport Rail Link

The British Transport Commission announces that in agreement with British European Airways and the British Overseas Airways Corporation, it has arranged with Rendel Palmer & Tritton, the consulting engineers, to survey a surface rail connection to London Airport. The scheme will comprise a branch railway, probably from the neighbourhood of Whitton Junction, on the Waterloo-Richmond-Staines line, into the central terminal area of the airport. Various widenings and additional operating facilities

will probably be required between Whitton Junction and the London terminus, which is likely to be Victoria. The making of a survey does not commit the B.T.C. to build a line; it is necessary to see exactly what can be done, and the probable cost. As soon as the survey report is ready it will be considered by the Government, the Air Corporations and the British Transport Commission.

Telephone Engineers' Pay Claim

A claim for pay increases ranging from 10s 6d to 15s 6d, according to grade, has been presented by the Post Office Engineering Union on behalf of some 70,000 telephone engineers of the Post Office. The claim is based on increases which have taken place in other industries.

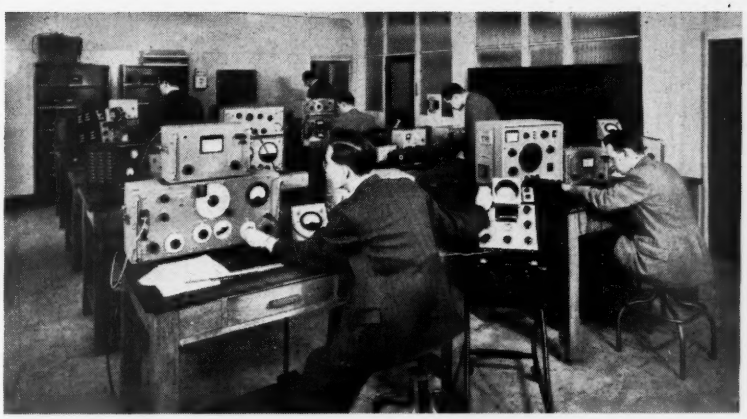
Present scales range from £7 3s for labourers to £9 1s 6d for fully skilled craftsmen, and £11 11s 6d for technical officers at the maximum of their scale. Rates between 5s and 9s higher, according to grade, are paid in London.

Electronics School

Developments in the field of electronics have moved, and are moving, too fast for knowledge to be imparted by textbooks, which must inevitably be a year or two behind the latest researches, declared Sir Thomas Eades, managing director of the Automatic Telephone & Electric Co., in welcoming visitors to the School of Electronics recently established in the company's Strowger Works, Liverpool. The occasion was the school's first "open day." Guests included Professor J. M. Meek (Electrical Engineering, Liverpool University), Professor J. D. Craggs (Electronic Engineering, Liverpool University), the principals of several colleges of technology and others interested in the science of telecommunications.

With the prospect of increasing applications of electronic devices and principles to telecommunication engineering, A.T. & E. in September last opened its own post-graduate school of electronics, its purpose being to provide within the organisation the training facilities necessary to equip students and engineers with fundamental knowledge. One of the first of its kind in the country, with lecture rooms, laboratories, study rooms and a well-equipped workshop, the school does not duplicate the work of the universities and technical colleges. It has initially two types of course, one of three months' and the other of one year's duration, and has accommodation for 30 students.

Amongst the subjects covered are: theory and application of semi-conductors, developments and applications of dielectric and magnetic materials, design of instrument transformers and filters, cathode ray tubes, information theory and storage, pulse techniques and applications such as time division multiplex, theory and application of wave guides, amplifier design, servo control manufacture and applications of crystals.



View of one of the classrooms at the A.T.E. School of Electronics

Sir Thomas Eades said that in 1911 the company brought the present British system of automatic telephony to England. In the process of development the company, which employed more than 10,000 workpeople at Liverpool, had been dealing with a rapidly advancing art, and particularly since the end of the war it had been almost impossible to catch up with new ideas.

For many of the things happening to-day there were no textbooks. Millions of pounds were being spent in various branches of telecommunications and consequently all over the world there was an enormous shortage of scientists, physicists and engineers capable of making their contribution to the art. Hence they had to be created. That was one of the things which Mr. W. A. Turner, B.Sc.(Eng.), M.I.E.E., was trying to do at the company's School of Electronics.

Mr. Turner mentioned that the one-year course would be relinquished when the universities and technical colleges could supply sufficient men of the right type for the work which had to be done.

New London Television Station

The B.B.C.'s new London television transmitting station at Crystal Palace will be brought into service on 28th March. The transmissions from the Alexandra Palace station, which began the first regular high-definition television service in the world in November, 1936, will then come to an end. The new transmitters will operate on the same frequencies as Alexandra Palace (Channel 1, vision 45·0 Mc/s, sound 41·5 Mc/s) and the transmissions will be vertically polarised as at present.

Initially, the Crystal Palace station will use an aerial system mounted on a temporary 250ft mast and the effective radiated power (e.r.p.) will be 60 kW (vision), compared with 34 kW from Alexandra Palace. This will give a considerable improvement in reception in the south-east of England. In the summer an improved aerial erected on the permanent tower at the Crystal Palace will increase the e.r.p. of the vision signal to 120 kW. The final aerial on the finished tower is expected to be available for service before the end of 1957, when the e.r.p. will be further increased to 200 kW.

S.I.M.A. Handbook

The Scientific Instrument Manufacturers' Association of Great Britain, Ltd. (S.I.M.A.), 20, Queen Anne Street, London, W.1, has published the 1956 edition of the "British Scientific Instruments Directory and Handbook." The last edition was published in 1952, and the present publication has therefore been considerably revised and extended. In an introduction, Mr. C. E .T. Cridland, the president, briefly refers to the history of the Association and its present activities. In its 268 pages, the handbook indicates the great versatility and wide range of instruments produced by the Association's members. A foreword is contributed by Sir Lawrence Bragg and after listing the officers and Council of the Association and the names of past-presidents, the handbook includes a list showing the geographical distribution of members, a comprehensive classified index of products, and a four-language glossary of headings used in the index of products (English, French, German and Spanish). A large part of the handbook is devoted to illustrated announcements of members.

Industrial Safety Trophy

The Royal Society for the Prevention of Accidents has been presented with a trophy by Sir George Earle, chairman of the Associated Portland Cement Manufacturers, Ltd., which will be awarded annually for an outstanding contribution to industrial accident prevention made either during the current year or over a period of years.

Entry for the award is open to all industries, companies, local accident

prevention groups, branches of the Institution of Industrial Safety Officers, and such other bodies within the United Kingdom as the National Industrial Safety Committee of the Society may from time to time determine. At no time will the award be made to an individual. It will be presented each year at the Society's National Industrial Safety Conference. This year the Conference will be held at Scarborough from 11th to 13th May and organisations desiring to be considered for the first award can obtain an official entry form from the secretary of the Society, Terminal House, 52, Grosvenor Gardens, London, S.W.1. The successful entrant will also hold permanently a commemoratory plaque.

A.E.I. and E. K. Cole in Australia

Negotiations are at an advanced stage for the formation of a new Australian company to be owned jointly by Associated Electrical Industries, Ltd., and E. K. Cole, Ltd., in connection with television and radio developments. It is proposed that the authorised capital shall be £A1,000,000 and that this shall be provided as the project develops.

Discussions are proceeding for the distribution and servicing of the products of the new company to be dealt with by Australian Electrical Industries Pty., Ltd., which may also in the future participate in the new company.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £179 0s 0d
COPPER, H.C. Electro	ton £424 10s 0d
Fire Refined 99·70 %	ton £423 0s 0d
Fire Refined 99·50 %	ton £422 0s 0d
COPPER Tubes ..	lb 4s 1¾d
Sheet	ton £497 5s 0d
H.C. wire and strip ..	ton £474 10s 0d
LEAD, English ..	ton £120 15s 0d
Foreign	ton £119 0s 0d
MERCURY	flask £86 10s 0d
TIN, block (English) ..	ton £828 15s 0d
ZINC, G.O.B. Foreign	ton £102 10s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 3s 3½d
Sheet	ton £383 10s 0d
Wire	lb 3s 9½d
PHOSPHOR BRONZE Wire	lb 5s 8d
PLATINUM	oz £34 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 29½d–29⅝d

Change of Name

The name of the Whitworth Electric Lamp Co., Ltd., has been changed to Whitworth Electric Co., Ltd. As from 1st April next its wholly owned subsidiary companies, Wall & Attwooll, Ltd., Portsmouth and Farnham, Surrey, and Dormor & Co., Ltd., Boscombe, Bournemouth, Hants, will change their names and trade as Whitworth Electric Co., Ltd., at their respective addresses. All purchase invoices and correspondence should be sent under the new name to the address concerned, as previously.

Electrical Employment

An increase in the civil working population of Britain last year of 280,000, making the total 23 million, is reported in the *Ministry of Labour Gazette*. Much the largest rise, 173,000, was in the metals, engineering and vehicles group, including 45,000 in the production of electrical goods and equipment. Employment in the various sections of the electrical industry is analysed in the accompanying table.

Class	Dec., 1954	Dec., 1955
Elec. machinery	182,100	192,000
Elec. wires and cables ...	61,600	65,400
Telegraph and telephone ap.	53,700	57,400
Radio apparatus and gramophones	133,600	144,400
Radio valves and elec. lamps	48,100	55,300
Batteries and accumulators	19,800	20,600
Other elec. goods	168,400	176,900
Elec. wiring and contracting	74,300	77,800
Electricity	196,100	200,500

Burnley Wiring Contract

Reasons why the Burnley Corporation General Purposes Committee recommended the acceptance of the second lowest tender for the rewiring of the Burnley Municipal College have been stated to the Ministry of Education. This tender, put in by the Corporation Works Committee, amounted to £11,720. The Ministry having withheld its approval, the General Purposes Committee now recommends acceptance of the tender for £9,914, submitted by R. A. Ranson, electrical contractor, Blackburn, subject to a satisfactory bond being obtained.

I.E.C. Change of Address

From 1st April the address of the Central Office of the International Electrotechnical Commission will be 1, Rue de Varembé, Geneva, Switzerland (telephone: (022) 34 11 60).

Nuclear Power Station Inquiry

The Ministry of Fuel and Power has decided to hold a public inquiry into the proposal of the Central Electricity Authority to build a nuclear power station at Bradwell-on-Sea.

Electrical Industries Club

At last Tuesday's luncheon of the Electrical Industries Club the president, Mr. Leslie Gamage, announced that the annual meeting of the Club would be held on 10th April at 11.45 a.m. The speaker at the subsequent luncheon would be Mr. Harold Abrahams, the noted athlete. Mr. Gamage then introduced Mr. D. D. Walker, managing director of Evershed & Vignoles, Ltd., and past-chairman of the B.E.A.M.A. Council. Mr. Walker gave a talk on the Restrictive Practices Bill now before Parliament. He agreed that trade practices which were justified in less favourable times were now sometimes harmful. Nevertheless the Bill as it stood was not a good one and endeavours would be made to improve it during its passage through the House of Commons. He hoped that it presaged attention to the restrictive practices of employees in due course. The vote of thanks to the speaker was proposed by Mr. E. G. Batt.

Westool Extension

An extension to its existing factory premises at St. Helen's Auckland, Co. Durham, is due to be completed this month by Westool, Ltd., which will double the production and office area.

Trade Announcements

The **Wholesale Fittings Co., Ltd.,** announces that its wholesale branch at 101, Dean Street, Oxford Street, W.1, has been transferred to larger premises at 13, Berners Street, Oxford Street, W.1 (telephone: Langham 6771). The company has published an accessories catalogue (168 pages) covering a comprehensive range of wiring material, cable, tubing, switchgear, etc.

The London office of **Cooke & Ferguson, Ltd.,** is now at 1-3, Brixton Road, S.W.9 (telephone: Reliance 7676).

To cater for expanding business, **Marconi Instruments, Ltd.,** recently opened new offices and showrooms in Lancashire House, 9, South Street, Manchester, 2.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 22nd March:—

UNICORN (design). No. 748,178. Class 9. Domestic electric polishing machines and electric vacuum cleaners.—British Unicorn, Ltd., 36-38, Southampton Street, Strand, London, W.C.2.

FILLEREES. No. B742,542. Class 9. Electric arc welding electrodes.—English Electric Co., Ltd., Queens House, 28, Kingsway, London, W.C.2.

SAM. No. 747,479. Class 9. Electric carpet cleaners and electric vacuum cleaners.—L. B. Parkes, trading as Samuel Price, Tantarra Street Works, Tantarra Street, Walsall, Staffs.

CUTLER-HAMMER (design). No. 745,503. Class 9. Electric apparatus for use in controlling the flow of current to machines, engines and motors; and motor starters being electrical switchgear (not parts of machines), lifting and separating magnets (electric), electric switches, rheostats, relays, contactors, switch and control panels, and solenoids, all being goods for sale in the counties of Middlesex, Yorkshire, Gloucestershire, Northumberland, Staffordshire, Surrey, Hertfordshire, Wiltshire, Cheshire, Durham, Essex, Oxfordshire, Northamptonshire, Lincolnshire, and in Wales and Scotland.—Cutler-Hammer, Inc., Milwaukee, Wisconsin, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, London, W.C.2.

No. B744,265 (design). Class 14. Electrically and mechanically operated horological instruments.—Hongkong Chiap Hua Manufactory Co. (1947), Ltd., Victoria, Hong Kong. Address for service, c/o Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.2.

GENERATION AND DEVELOPMENT

Bulk Supply Tariff

On page 147 of the advertisement section of this issue the Central Electricity Authority gives details of the bulk supply tariff for the year ending 31st March, 1957. It will be seen that the kW charge is raised from £4 15s to £5 per kW of simultaneous maximum demand and the datum figure from 16,630,000 to 18,000,000 kW. The running charge remains at 0·5d/kWh and the coal-cost variation charge at 0·0006d/kWh for each penny that the fuel cost per ton is above or below 60s.

Suspension of Hire "Regretted"

The South of Scotland Electricity Consultative Council has passed a resolution regretting the suspension of the hire schemes for cookers and water heaters and expressing the hope that they will be reintroduced at the earliest possible date. It was stated that there would be greater hardship in the area than in England and Wales because the practice of hiring equipment was more firmly established in Scotland, and there would be a considerable loss of revenue to the Board. The estimated capital expenditure in 1956 on cookers and water heaters for hire was stated by the Board to have been £1,100,000; because of the credit restrictions this was being cut to £300,000.

Pre-Vesting-Day Hire Agreements

Because the rentals received are disproportionate to the cost of maintaining the equipment, a number of consumers in the Eastern Electricity Board's area who rent their cookers under pre-vesting-day simple hire schemes are to be given notice terminating the agreements. The cookers will either be offered to the consumers free or at a nominal charge. In a letter to the Electricity Consultative Council the Board said that about half of the people who had hired cookers under these schemes had voluntarily decided to change to modern appliances. Of those cookers that remained in use many were obsolete and in some cases the parts were no longer obtainable. In Peterborough, for example, there were about 1,300 cookers 15-30 years old which were let at rentals of from 2s 6d to 4s 6d a quarter.

This does not affect the reconditioned cookers which the Board hires out at 13s a quarter.

West End Service Centre

The London Electricity Consultative Council has discussed with the Board the cost and value of the Regent Street Service Centre. At the suggestion of the Council it has been agreed to keep the centre open until 7 p.m. on one night a week for an experimental period of six months in order to increase its usefulness.

M.E.B. "Century"

Members of the Midlands Electricity Board on 5th March attended the 100th meeting of the Board since its formation and to celebrate the "century" former members were invited to meet present members at a luncheon between the morning and afternoon sessions. The chairman of the Board, Mr. W. S. Lewis, who has not missed one of the 100 meetings, presided.

Stratford Change-Over Complete

The Mayor of Stratford-on-Avon (Councillor D. E. Woodman) on 1st March switched off the d.c. supply to the town and then closed a second switch to give an a.c. supply. The ceremony, at the Midlands Electricity Board's Arden Street works, marked the completion, ten months ahead of schedule, of the £68,000 scheme for the standardisation and improvement of electricity supplies to the town.

Tariffs for Boarding Houses

The Eastern Electricity Consultative Council last week passed a resolution expressing regret at the length of time taken by the Central Authority's Retail Tariffs Committee in dealing with the question of tariffs for boarding houses, small hotels, etc.

C.E.A. Contracts

Contracts have been placed by the Central Electricity Authority during the past month for power stations, transforming stations and transmission lines amounting in the aggregate to £8,565,890. The principal contracts include:—

Acton Lane "B" power station, Willesden: Reinforced concrete water cooling tower.—Film Cooling Towers (1925), Ltd.

Marchwood power station, near Southampton: Civil engineering works.—Sir Robert McAlpine & Sons, Ltd.

Hams Hall "C" power station, near Birmingham: Three 550,000 lb/hr boilers.—Simon-Carves, Ltd.

Dunston power station, near Newcastle-upon-Tyne: 66 kV, 2,500 MVA switchgear.—A. Reyrolle & Co., Ltd.

West Weybridge substation: Site and foundations.—Harbour & General Works, Ltd.

Iver substation, Bucks: 132 kV switchgear.—A. Reyrolle & Co., Ltd.

Penn substation, Midlands: Four 120 MVA, 275/132 kV transformers.—Metropolitan-Vickers Electrical Co., Ltd.

Attercliffe substation, Yorks: One 60 MVA, 132/33 kV transformer.—English Electric Co., Ltd.

Willington-Castle Donington—Iver: 275 kV overhead line.—Balfour Beatty & Co., Ltd.

New Zealand Submarine Cable Project

The project to link the electric power resources of the South Island of New Zealand with the supply network of the industrial North Island by means of a submarine cable across Cook Strait has become a distinct engineering possibility. The Minister in Charge of the State Hydro-Electric Department, Mr. Stanley Goosman, has announced that British Insulated Callender's Cables, Ltd., has been instructed to investigate the practicability of the scheme immediately and to report by the end of this year. Because of the large volume of power which will be transmitted between the islands, a new type of cable would have to be constructed, and, if carried out, the whole scheme will be a unique engineering feat.

The award of this investigation contract to British Insulated Callender's Cables follows the extensive work carried out by the company for the Central Electricity Authority on the cross-Channel submarine cable project and the contract from the British Columbia Electric Co. for the manufacture, already completed, and installation this summer, of some 90 miles of 138 kV submarine power cable connecting the mainland with Vancouver Island across the Georgia Strait.

One of the new four-coach train sets with G.E.C. electrical equipment for next year's Liverpool Street–Southend (Victoria) services on exhibition at Southend Central Station during the London Tilbury & Southend Railway centenary celebrations. On the right is "Thundersley," the only surviving steam locomotive of the former L.T.S.R.

Financial Section

STOCKS and SHARES

STOCK Exchange markets had barely time to adjust themselves to the new 5½ per cent Bank Rate, and its supporting measures, before disconcerting news from abroad made its addition to the problems already existing in the domestic field. Assailed on two fronts, investment confidence consequently had little chance to re-establish itself, and prices tended to slip further back. Measured by the accepted share-price indices, industrial ordinary shares have now lost just on a quarter of their value in the nine months since last summer; and the average yield on them has risen from about 4¼ to over 6 per cent. In the same period, the price of 2½ per cent consols has fallen by one-fifth. News that Associated Electrical Industries and E. K. Cole are joining forces in the promotion of a new Australian company, to develop television and radio, served to arouse a good deal of favourable attention.

Price Changes

Selling of rights to the new £24 million A.E.I. issue kept the premium on the new ordinary shares down to a few pence above the offered price of 57s 6d. The last day for acceptance by shareholders, and for payment of the first call of 20s, is next Friday (23rd March). Among other rights issues, Decca and Plessey new shares made useful recoveries to a premium of about 10s in each case. The latter are now fully paid. Shares in the "atomic power" group regained part of further falls. Details of the new railway electrification plans failed to induce the upward reactions which might ordinarily have been expected among the shares concerned. Cable & Wireless ordinary were little moved by the proposal to split the £1 shares into 5s units. At the beginning of this week, markets were beginning to show rather better stability.

Motor Accessories

Troubles of the motor industry have inevitably unsettled investments concerned with its electrical and other accessories. As a result, the fall of prices in this section of the market has exceeded the average. Compared with last year's top prices, the depreciation in J. Lucas £1 shares at 31s 9d amounts now, for instance, to about 25s, while S. Smith 4s ordinary have come down in a similar period from 20s to 11s 3d. Yields on last year's dividends have gone up correspondingly to 4·7 and 6·2 per cent respectively. An interim dividend declaration is due from Lucas within a week or two; S. Smith usually declare theirs in June. Meanwhile it is to be noted that both companies dealt very conservatively with the big expansion of their earnings up to last year. The Lucas dividend for 1954–5 was covered six times by available profits, and that of S. Smith had four-fold cover.

British Electricity Stocks

Foreign affairs, and a decline in the exchange value of sterling, halted what

Price Changes in

Company or Board	Nom. Value	Middle price 12th Mar.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1955 Highest	1955 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	76½	−1	3	3	3 18 6	94¾	76½
Brit. Elec. 1974/77	100	75½	−¾	3	3	3 19 9	93½	75½
Brit. Elec. 1976/79	100	80½	−1	3½	3½	4 6 9	98¾	80½
Brit. Elec. 1974/79	100	88¾	−¾	4½	4½	4 15 9	109	90½
Overseas Electric Supply								
Calcutta Elec.	£1	19/3		6†	6†	6 4 9†	22/6	20/9
East African Power	£1	21/-		7	7	6 13 3	24/6	19/9
Nigerian Elec.	£1	19/9		10	10	10 2 6	27/-	21/-
Palestine Elec. "A"	£1	21/-		Nil	Nil	Nil	22/9	21/-
Perak Hydro-Elec.	£1	15/9		10	10	—	22/3	17/9
Equipment and Manufacturing								
Aberdare Cables	5/-	10/9		12½	17½	8 2 9	14/6	11/-
Aerialite	1/-	5/-	−9d	88½	45*	9 0 0	6/9	5/3
Allen, W. H.	£1	67/-	−2/-	20	20	5 19 6	83/9	74/6
Aron Elec. Ord.	£1	54/3		15	15	5 10 6	63/9	55/6
Assd. Automation	10/-	26/9	−3d	10	10	3 14 9	32/-	11/-
Assoc. Elec. Ord.	£1	58/3	−1/3	14	15	5 3 0	96/-	62/6
Automatic Tel. & El.	£1	60/-	−1/3	15	15*	5 0 0	79/6	60/-
Babcock & Wilcox	£1	65/-	−9d	12*	15	4 12 3	98/-	68/6
Baldwin, H.	2/-	4/3	+3d	20	20	9 8 6	5/6	4/4
Bakelite	10/-	27/3	−1/9	16	16	5 17 6	34/6	27/-
British Aluminium	£1	40/6	−2/6	10	12	5 18 6	58/-	35/3
B.I. Callender's	£1	46/-	−1/6	10	12½‡	5 8 9	55/3	44/9
B.I. Callender's 6% Pref.	£1	21/9		6	6	5 10 3	26/6	21/9
British Thermostat	5/-	25/6	−9d	27½	27½	5 7 9	35/-	22/6
British Vac. Cleaner	5/-	7/-	−6d	25	30	—	10/-	6/6
Brook Motors	10/-	40/-	+6d	20	25	6 5 0	47/-	39/9
Brush Ord.	5/-	6/6		6	10	7 13 9	9/6	7/6
Bulgin, A. F.	1/-	6/6		45	50	7 14 0	8/-	4/-
Burco Dean	5/-	9/-		—	22½	12 10 0	17/3	12/-
Chloride El. Storage "A"	£1	61/9		12½	17½	5 13 3	77/6	58/6
Clarke Chapman	£1	93/9		20	22½	4 16 0	102/6	68/9
Cole, E. K.	5/-	16/6	−6d	27½	17½*	5 6 0	25/6	18/3
Cossor, A. C.	5/-	7/-		10	15	10 14 6	14/-	8/9
Crabtree	10/-	27/3		20	20	7 6 9	34/6	27/6
Crompton Parkinson Ord.	5/-	12/6	−9d	20	16*	6 8 0	19/9	15/-
De La Rue	5/-	15/6	−2/3	20	30	9 13 6	26/-	17/-
Decca	4/-	31/3	+4/9	56¼	43¾*	5 12 0	48/9	31/-
Desoutter	5/-	26/6		25	30	5 13 3	35/-	25/6
Dewhurst	2/-	10/6	−1/-	24	30	5 14 3	11/3	7/3
Dictograph Tel.	2/-	6/-		20	20	6 13 3	9/3	9/6
Dubilier Condenser	1/-	4/-		25	25*	6 5 0	5/7	3/1
E.M.I.	10/-	28/-	−9d	10	15	5 7 3	37/-	25/3
Electrical Components	5/-	13/9		20	25	9 1 9	21/3	13/9
Elec. Construction	£1	26/3		15	8½	6 9 6	41/3	28/9
Enfield Cable Ord.	£1	15/3		Nil	Nil	Nil	25/3	18/6
English Electric	£1	48/-	−1/9	12½	12½	5 4 3	86/9	54/3
English Electric 3¾% Pref.	£1	13/3	−6d	3¾	3¾	5 13 3	16/9	14/-
Ericsson Tel.	5/-	33/9	−1/3	25†	25*†	3 14 0†	46/6	29/-
Ever Ready	5/-	25/-	−1/-	40	35*	7 0 0	38/-	22/3
Falk Stadelmann	£1	36/6	−6d	15	17½	9 11 9	52/6	42/-
G.E.C. Ord.	£1	50/6	−1/3	12½	14	5 11 0	80/3	51/3
G.E.C. 6½% Pref.	£1	22/9		6½	6½	5 14 3	28/4	23/6
General Cables	5/-	13/-		30	30	11 10 9	17/-	15/-
Greenwood & Batley	£1	46/3		17½	17½	7 11 3	57/6	45/-
Hackbridge Cable	5/-	19/-	−6d	20	25	6 11 9	23/9	14/-
Hackbridge & Hewittic	5/-	17/9	−1/3	25	30	—	24/9	17/-
Heatrae	2/-	4/9		12½	15	6 6 3	5/9	4/3
Henley's	10/-	15/-	−9d	10½	10½	7 0 0	21/3	15/9
Holophane	5/-	17/-	+3d	25	30	8 16 6	19/9	16/-

* After scrip issue. † Free of income tax. ‡ Dividend forecast.

looked to be a promising recovery movement in the gilt-edged market. Prices remained, however, a point or two above the level to which they had fallen in advance of last month's increase in Bank Rate. Of the British Electricity stocks, the main interest is still in the large (and tax-free) capital profits due upon the eventual redemption of the two 3 per cent issues. They now stand some 24 points below the figure of 100 at which they must eventually be paid off, between 1968–73 in the one case, and 1974–77 in the other. Current yields are close upon 4 per cent.

Electrical Investments

Company or Board	Nom. Value	Middle price 12th Mar.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1955 Highest	1955 Lowest
Equipment and Manufacturing—continued.						£ s d		
Hoover	5/-	23/3	−1/9	70	50	10 15 0	52/6	35/6
I.C.I.	£1	43/6		15	10*	4 12 6	61/9	38/3
Intl. Combustion	5/-	17/-		25	20*	5 17 9	24/6	16/-
Johnson & Phillips	£1	38/6	−1/-	15	15	7 15 9	52/6	39/6
Lancashire Dynamo	£1	40/6	−2/-	14	15	—	56/5	37/3
Laurence, Scott	5/-	14/-	−6d	20	12½*	4 9 3	19/6	14/6
Lister, R. A.	£1	28/6	−1/-	9·3	10	7 0 3	40/-	28/9
London Elec. Wire	£1	48/6		10	12½	5 3 0	61/3	50/6
Lucas, J.	£1	31/9	−3d	7½	7½	4 14 6	56/6	38/9
Marryat & Scott	2/-	9/3		25	30	6 9 9	13/-	9/6
Mather & Platt	£1	53/9	−2/-	13·4*	15	5 11 6	75/-	48/-
Metal Industries	£1	17/6	−9d	9	9	—	38/-	25/-
Midland Elec. Mfg.	£1	46/-	−1/-	10	12½	5 8 9	55/-	44/-
Morphy-Richards	4/-	22/-	−1/-	35	50	9 1 9	35/-	27/-
Murex	£1	61/-	−1/3	15	20	6 11 3	67/6	49/3
Newman Ind.	2/-	2/6		10	10	8 0 0	3/6	2/4
Oldham & Son	1/-	2/6		17½	20	—	3/6	2/1
Parnall (Yate)	5/-	6/-	−6d	8	14	11 13 6	13/2	7/3
Parsons, C. A.	£1	64/-	−6d	7½	10	3 2 6	100/-	56/-
Plessey	10/-	60/-	+3/-	27½	30‡	5 0 0	89/-	55/-
Pye "A" Deferred	5/-	14/6	−1/6	20	12½*	4 6 3	32/9	14/3
Revo	10/-	8/9	−6d	9	9	10 5 9	15/6	12/6
Reyrolle	£1	83/-	−1/6	13¾	15	3 12 3	127/6	89/-
Rheostatic	4/-	12/9		20	22½	—	14/3	9/3
Richardsons Westgarth	5/-	14/6		15	16¾	5 15 0	19/-	11/-
Scottish Cables	4/-	15/9	−9d	27½	27½	6 19 9	22/6	16/3
Smith (England), S.	4/-	11/3	−6d	17½	17½	6 3 9	20/-	14/9
Southern Areas	£1	22/-		7½	10	9 1 9	38/-	27/6
Strand Elec.	5/-	7/3		17½	15*	10 6 9	13/3	7/6
Sturtevant	5/-	25/6	−1/-	18·9	14·4*†	2 16 6†	35/9	21/-
Sun Elec.	£1	34/6		15	20	11 12 0	35/-	33/9
Switchgear & Cowans	5/-	14/6	−1/9	10	20	6 18 0	47/-	11/-
Taylor Tunnicliff	5/-	11/6		15	15	6 10 6	16/3	11/3
T.C.C.	10/-	41/-	−1/6	25	25	6 2 0	53/9	41/-
T.C. & M.	£1	27/-	−1/6	8½	8½	6 6 0	40/9	29/3
Telephone Mfg.	5/-	6/6		10	10	7 13 9	11/6	7/9
Thorn Elec.	5/-	16/9		20	15*	4 9 6	33/-	13/9
Thornycroft	£1	43/6		15	15*	6 18 0	48/9	34/6
Tube Investments	£1	56/3	−2/3	22½	14*†	4 19 9	62/6	55/-
Vactric	5/-	17/6	−1/-	10	15*	4 5 9	22/-	12/-
Veritys	5/-	6/9	−3d	12½	12½	9 5 3	12/2	7/-
Walsall Conduits	4/-	11/6		70	70	—	17/3	12/-
Ward & Goldstone	5/-	31/-	−2/-	50	30*	4 16 9	45/-	32/6
Watford	2/-	6/9		22½	25	—	8/9	6/3
Westinghouse Brake	£1	73/-	−1/-	18	18	4 18 9	110/-	82/-
West, Allen	5/-	12/6	−6d	17½	15*	6 0 0	16/6	8/-
Wolf Electric	5/-	20/-	−6d	17½	20	5 0 0	26/3	16/1
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A. Ord.	100	75	−4½	6	6	8 0 0	88	67½
Ord.	100	49	−1½	3½	3½	7 13 0	54½	45
Anglo-Portuguese	£1	21/9		8	8	7 7 3	27/-	21/-
Brit. Elec. Traction:								
Def. Ord. "A"	5/-	16/-		50	22½*	7 0 9	24/3	19/-
Cable & Wireless:								
Ord.	£1	38/6	−6d	10	10	5 4 0	54/-	39/6
4% Loan	100	90		4	4	4 9 0	100	92/-
Calcutta Trams	£1	24/3		6†	7½†	6 3 9†	26/9	20/-
Cape Elec. Trams	£1	20/6		5½	7½	7 6 3	19/6	16/6
Marconi Marine	£1	31/6	+3d	10	10	6 7 0	41/3	31/3
Oriental Tel. Ord.	1/-	83/-		16	—	—	102/6	72/6
Telephone Rentals	5/-	9/9	−9d	10	12½	6 8 3	13/6	9/6

Ericsson Results

Ericsson Telephones 5s ordinary shares were not much changed after the announcement of the results for 1955, and the decision to bring the distribution to the same total of 20 per cent tax-free as before. The profits statement shows that while turnover (half of it for export) established another record, the trading surplus came out somewhat lower. It thus repeats a story which is becoming increasingly familiar in this year's company reports. Higher costs and keen export prices are accounted responsible for the reduction, which, however, is more than offset by a decrease in the tax charge at £537,000. After the latter, the net figure is up from £578,000 to £628,000, of which two-thirds goes back into the business. A very satisfactory order book, ensuring full production throughout this year, is reported. The net yield of 3·7 per cent on the shares at 33s 9d is equivalent to 6·4 per cent, subject to tax.

Magicoal Dealings

The market in the newly introduced 5s ordinary shares of Berry's Electric Magicoal opened at prices around 5s 9d. A dividend of 10 per cent for the year 1956–7 was indicated in the prospectus, so that the yield basis is in the region of 8¾ per cent. The dividend estimate is based on the assumption that profits will be maintained in this period at about the 1954–5 level of £132,000 (before tax), which would cover the proposed distribution approximately four times over. A ten-year record of earnings in the prospectus showed a striking rise in profits for 1954–5, due mainly to larger sales of the popularly priced electric fires. Demand for these was said to exceed the output capacity of the two factories, and a continued rise was expected in sales of electric heating appliances and water heaters.

Domestic Equipment

Reports of current trading conditions in many of the "consumer" goods industries have continued to weigh upon investments connected with domestic electrical equipment. The full report from Hoover says that the decision to reduce the dividend from 70 to 50 per cent was influenced by this year's trading conditions and by the Chancellor's statements. The report discloses that the reduction in the group profit from £4·6 to £3·8 million for 1955 was due not to any decrease in turnover, which in fact rose by 11 per cent, but to the policy of holding down selling prices in the face of rising costs. An interesting analysis of where each £1 of the company's income goes, shows that wages took 5s 8d, materials 5s 2d, purchase tax 4s 7d, income tax and other expenses 3s 7d; leaving 5d for dividend and 7d to be ploughed back.

REPORTS and DIVIDENDS

International Combustion (Holdings), Ltd.—The annual general meeting will be held on 27th March. In his circulated statement Mr. G. R. T. Taylor (chairman) says that the value of orders on hand at the close of the period under review was considerably in excess of that at the end of the previous year. This was due to the receipt during the period of the contract for steam raising plant for the High Marnham power station. This order was the largest ever received by their organisation and also the largest single order placed in this country for plant of this nature. Works output fell slightly from the previous record level owing to loss of skilled labour, but the output per man increased. Whilst not yet contributing to the profits of the organisation the newly formed subsidiary companies in this country are making good progress, as are also the subsidiary companies in India and Pakistan. Each of the associated companies in South Africa and Australia had successful financial results for the year under review. The Australian company has received instructions from the Electricity Commission of New South Wales to proceed with the extensions of the Tallawarra power stations, a contract worth approximately £A4 million; half the plant will be manufactured in England and the other half in Australia.

Members of the staff of the organisation are already engaged upon training and development studies in the field of nuclear energy. A new company, International Combustion (Nuclear Applications), Ltd., has been formed to continue research work in all fields associated with the new science. In order to broaden the basis of the activities of the organisation, development and expansion in other fields closely allied to the main business of the group is being undertaken and in particular in regard to the utilisation of gaseous and liquid fuels.

Bruce Peebles & Co., Ltd.—Sir William Darling (chairman), in his statement to stockholders covering the company's operations during 1955, says that the order book, notwithstanding the maintenance of a high level of output, was fuller at the end of the year than at the beginning, and this applied equally to transformers and rotating plant. The large volume of orders received during the year was again characterised by the inclusion of many contracts for large units and was obtained from sources all over the world. The steady expansion of the fuel and power industries, including hydro-electric works, and the significant progress in nuclear power production in this country, have resulted in a large proportion of the business coming from industries at home. Nevertheless orders from abroad have also been substantial. Speaking of the necessity to keep abreast of modern scientific developments, the chairman says that they are forming the nucleus of a research team for electronics. This is being done under the ægis of the Scottish Council (Development and Industry) in co-operation with other Scottish engineering companies and is being sponsored at high Government level.

Desoutter Brothers (Holdings), Ltd.—In his circulated review of the company's activities in 1955, Mr. G. H. Webb (chairman) says that the order book remains in a healthy condition, with productive capacity at full stretch. In view of this a long-term plan has been completed for major extensions to the factories at Hendon. Official approval has been received and the first contracts for buildings and machine tool equipment will be placed during the current year to an estimated cost of £150,000. Additional space is being provided for the design, research and experimental departments.

Taylor, Tunnicliff (Electrical Industries), Ltd.—After providing £182,849 for taxation, the net profit for 1955 is £163,809, as compared with £166,081 for 1954. General capital reserve receives £81,722 and general reserve £100,000. It is proposed to maintain the dividend for the year at 15 per cent and to carry forward £308,929 (against £382,161 brought in).

Ericsson Telephones, Ltd.—The accounts for the year ended 31st December last show a trading profit of £1,165,081, as compared with £1,272,732 for the preceding year, and after meeting all charges, including £536,918 for taxation, the net balance is £628,163 (against £577,994). It is proposed to pay a final ordinary dividend of 12 per cent and a bonus of 4 per cent, maintaining the distribution for the year at 20 per cent, tax free. General reserve receives £400,000 and the balance carried forward is £356,689 (against £336,587 brought in).

Hoover, Ltd.—The annual review for the year 1955 says that in spite of heavy competition in export markets and restrictions in the home market the company's turnover increased by 11 per cent over 1954. Of the total British exports of electric cleaners the company sold 70 per cent, and of washing machines 58 per cent.

The Midland Electric Manufacturing Co., Ltd.—In his circulated statement, which accompanies the report and accounts, Mr. A. Wynn (chairman and joint managing director) says that 1955 concluded with factory output surpassing all previous records. In 1955 the value of export business alone exceeded the total value of their entire output ten years before. In October the whole of the share capital of J. H. Tucker & Co., Ltd., together with its subsidiary, the Kersons Manufacturing Co., Ltd., was acquired, and it is intended in due course that the production and sales of the company and of the new subsidiaries will be integrated with consequent increase in productive efficiency and reduction in administration costs. Speaking of future trading prospects, Mr. Wynn says that the full impact of the Government's measures designed to combat inflation has yet to be felt, and the likelihood of less favourable conditions developing in the future cannot be ignored. They are, however, commencing the year with demand well maintained.

Bylock Electric, Ltd.—The profit for the year ended 31st July last is £80,496, as compared with £44,178 for the preceding year. Of this taxation absorbs £46,143. The dividend for the year is 33⅓ per cent (unchanged) on doubled capital. The directors recommend a scrip issue of non-voting "A" ordinary shares in the proportion of one for one. The new shares will rank for the current dividend of 33⅓ per cent.

The Plessey Co., Ltd., announces that the result of the offer to shareholders of 800,000 10s ordinary shares at 50s per share was that acceptances totalled over 99 per cent. Applications for additional shares amounted to over forty times the number of shares available and these have had to be heavily scaled down.

The Telegraph Condenser Co., Ltd., proposes to pay a final dividend on the ordinary capital for the year ended 31st December last of 20 per cent, maintaining the distribution for the year at 25 per cent. Profit on trading, etc., amounted to £611,637 (£482,224). Depreciation absorbs £52,244 (£40,181) and taxation after adjustments £256,930 (£216,665). A sum of £150,000 (£110,000) is transferred to general reserve and £128,781 (£96,115) is carried forward.

E. K. Cole, Ltd., have declared an interim dividend of 7½ per cent (unchanged).

Stothert & Pitt, Ltd., have announced an interim dividend of 5 per cent (unchanged) on ordinary capital increased by a seven-for-thirteen scrip issue.

Hick, Hargreaves & Co., Ltd., have received the consent of the Capital Issue Committee for a one-for-two scrip issue.

New Company

Vickers Nuclear Engineering, Ltd.—Registered 6th March. Capital £1,000. To carry on research work of all kinds, and particularly in the field of nuclear physics, including atomic energy and radioactive and fissile materials, substances, liquids, gases and other matter, whether organic or inorganic, and to conduct experiments and tests of all kinds, etc. Solicitors: T. C. Raymond, Vickers House, Broadway, S.W.1.

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 19th March

BIRMINGHAM.—Grand Hotel, 6.15 p.m. Birmingham Electric Club. Annual general meeting, followed by "Holland and Some Electrical Interests," by J. Ashmore.

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Supply Group. "Power Station Design," by E. C. Shackleton.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. Mersey & North Wales Centre. "Automatic Circuit Reclosers," by G. F. Peirson, A. H. Pollard and N. Care. (Joint meeting with the North-Western Centre.)

GREAT MALVERN.—Winter Gardens Restaurant, 7.30 p.m. I.E.E. South Worcestershire Group. "Radio Astronomy," by M. Ryle.

IPSWICH. — Electric House, 7.15 p.m. Ipswich & District Electrical Association. "Colour Television," by B. V. Somes-Charlton.

LEICESTER.—Demonstration Theatre, Electricity Offices, Charles Street, 6.45 for 7 p.m. Leicester Electrical Society. "Coloured and Directional Lighting as Applied to the Stage," by L. G. Applebee.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio & Telecommunication Section. Informal evening on "Electronics and Automation," followed by "Some Industrial Applications," by Dr. H. A. Thomas, with films and demonstrations.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Utilisation Group. "The Potentialities of Railway Electrification at the Standard Frequency," by E. L. E. Wheatcroft and H. H. C. Barton.

NEWCASTLE-UPON-TYNE. — King's College, 6 p.m. I.E.E. North-Eastern Radio & Measurement Group. Annual general meeting, followed by "Equipment of Instrumental Accuracy for Recording and Reproduction of Electrical Signals using Cinematographic Film," by H. McGregor Ross.

READING.—George Hotel, King Street, 7.15 p.m. I.E.E. district meeting. "The Nuclear Power Programme," by B. L. Goodlet.

STOKE-ON-TRENT.—Electricity Showrooms, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "The Supply of Electricity in the London Area," by D. B. Irving.

Tuesday, 20th March

COVENTRY.—Technical College, 7.15 p.m. A.S.E.E. Coventry Branch. "Supersonic Wind Tunnel," by W. F. Hilton.

EDINBURGH.—Carlton Hotel, North Bridge, 7 p.m. I.E.E. South-East Scotland Sub-Centre. "Equipment of Instrumental Accuracy for Recording and Reproduction of Electrical Signals using Cinematograph Film," by H. McGregor Ross.

GLOUCESTER. — Fleece Hotel, Westgate Street, 6.30 p.m. I.E.S. Gloucester & Cheltenham Centre. "Lighting for Photography," by R. W. Unwin.

HATFIELD. — Technical College, 7 p.m. I.E.E. district meeting. "Information Theory," by Dr. E. C. Cherry.

LEEDS. — 1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. Discussion on "New Courses for Electrical Technicians," opened by R. A. H. Sutcliffe.

LIVERPOOL.—9, The Temple, Dale Street, 6 p.m. I.E.S. Liverpool Centre. "Period Lighting," by D. W. Durrant. (Joint meeting with the E.A.W.)

LONDON.—At the Institution of Electrical Engineers, Savoy Place, 6.30 p.m. Association of Supervising Electrical Engineers. National lecture: "Automation," by F. W. Highfield.

At the Royal Institution, Albemarle Street, 5.30 p.m. Institution of Chemical Engineers. Presentation and discussion of "The Application of Fluidisation Techniques to Nuclear Reactors," by C. M. Nicholls, J. B. Morris and F. W. Fenning. (In conjunction with the British Nuclear Energy Conference.)

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Measurement & Control Group. "The Indirectly Heated Thermistor as a Precise a.c./d.c. Transfer Device," by F. C. Widdis.

NOTTINGHAM.—College of Arts & Crafts, 6.30 p.m. I.E.E. East Midland Centre. "Service Experience of the Effect of Corrosion on Steel-Cored Aluminium Overhead-Line Conductors," by Dr. J. S. Forrest and J. M. Ward.

PORTSMOUTH.—Air Balloon, 598, Commercial Road, Mile End, 7.30 p.m. A.S.E.E. Portsmouth Branch. "Aspects of Maintenance," by W. G. Stainer.

RUGBY.—College of Technology & Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. "The Potentialities of Railway Electrification at the Standard Frequency," by E. L. E. Wheatcroft and H. H. C. Barton.

At the British Thomson-Houston Co., Ltd., 7 p.m. Institution of Works Managers, Leicester Branch. "Kitchen Planning and Domestic Appliances," by G. S. Williams. (Joint meeting with the B.T.H. Foremen's and Supervisors' Association.)

Tuesday, 20th to Saturday, 24th March

LONDON.—Earls Court. Electrical Engineers Exhibition.

Wednesday, 21st March

BELFAST.—Queen's University, 6.30 p.m. I.E.E. Northern Ireland Students' Section. "Attitudes of Mind," by A. R. Cooper.

College of Technology, 7.30 p.m. Belfast Association of Engineers. "Peat Burning Power Stations," by J. P. Kelly.

CARDIFF.—Technical College, 6.30 p.m. British Institution of Radio Engineers, South Wales Section. "Electronic Servo-Mechanism," by J. L. Russell.

College of Technology, 6.45 p.m. Society of Instrument Technology, South Wales Section. Annual general meeting, followed by discussion on "Electrical versus Pneumatic Transmission."

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South-West Scotland Sub-Centre. "Equipment of Instrumental Accuracy for Recording and Reproduction of Electrical Signals using Cinematographic Film," by H. McGregor Ross.

Central Hotel, 7.30 p.m. British Institution of Radio Engineers, Scottish Section. Annual dinner.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "American Power Station Practice," by G. F. Kennedy.

Waterloo Bridge House, S.E.1, 5 p.m. Institution of Post Office Electrical Engineers, London Centre. "External Construction and Maintenance—are our Methods out of Date?" by R. H. de Wardt and S. T. E. Kent.

At the Institution of Civil Engineers, Great George Street, S.W.1, 5.30 p.m. Institute of Fuel, London Section. "Operational Studies of the Relationship between Coal Constituents and Boiler Fouling," by P. J. Jackson and J. M. Ward, "Full-Scale Trials of the Humidification of Combustion Air to Prevent Boiler Fouling," by A. M. Freedman and "An Investigation into Air-Heater Corrosion of Oil-Fired Boilers," by B. Lees.

Manson House, 26, Portland Place, 6.30 for 7 p.m. Society of Instrument Technology, Control Section. "A Novel Relay Amplifier," by J. H. Askew.

MANCHESTER. — Engineers' Club, Albert Square, 7 p.m. I.E.E. North-Western Graduates' & Students' Section. "Spark Breakdown in Non-Uniform Fields," by H. Latham.

NOTTINGHAM. — E.M.E.B. Showroom Theatre, Smithy Row, 7.30 p.m. A.S.E.E. Nottingham Branch. Annual films evening, including the "Electrical Engineers Exhibition Film."

PRESTON.—19, Friargate, 7.15 p.m. A.S.E.E. Preston Branch. "Stage Lighting and Equipment," by E. E. Faraday. (Joint meeting with the I.E.S. North Lancashire Group.)

ROCHESTER.—Bull Hotel, 7 p.m. Incorporated Plant Engineers, Kent Branch. "Plant Instrumentation and Electronic Control," by R. P. Townsend.

Thursday, 22nd March

GALASHIELS.—I.E.E. South-East Scotland Sub-Centre. "Farm Electrification," by C. A. Cameron Brown.

LONDON.—Hall of the Royal Empire Society, Northumberland Avenue, 7 p.m. Institution of Production Engineers, South Eastern Region, London Section. "Electronic Computers and the Production Engineer," by P. V. Ellis.

MANCHESTER. — Engineers' Club, Albert Square, 7.30 p.m. Institution of Engineering Inspection, North-Western Branch. "The Application of Ultrasonics to Engineering Inspection," by J. Brigg.

NORWICH.—Assembly House, 7.30 p.m. I.E.E. East Anglian Sub-Centre. "The Standardisation of Retail Electricity Tariffs," by A. O. Johnson and N. F. Marsh.

Thursday, 22nd March and Friday, 23rd March

GLASGOW.—The University. British Institution of Radio Engineers, Scottish Section. Symposium of papers on "Industrial Electronics in Scotland," including works visits.

Friday, 23rd March

BATH.—S.W.E.B., Old Bridge Street, 7 p.m. I.E.S. Bath & Bristol Centre. "Light and the Eye," by D. Curry.

CHELMSFORD. — Crompton's Social Hall, 7.30 p.m. Chelmsford Engineering Society. Conversazione.

HARROGATE.—Cairn Hydro Hotel, 7.15 for 8 p.m. I.E.E. North Midland Centre. Annual dinner and dance.

HULL.—Duke of Cumberland Hotel, Cottingham, 7.30 p.m. I.E.S. Leeds Centre. Supper.

LONDON.—Pepys House, 14, Rochester Row, 7 p.m. Junior Institution of Engineers. "The Nuclear Reactor as a Source of Power," by G. C. Allingham.

1, Birdcage Walk, S.W.1, 5.30 p.m. Institution of Mechanical Engineers. Annual general meeting.

MANCHESTER. — Engineers' Club, Albert Square, 6.45 p.m. Manchester Association of Engineers. Annual general meeting, followed by "The Production of Steel Strip and Sheets," by H. Edwards.

NEWCASTLE-UPON-TYNE. — Old Assembly Rooms, 7 p.m. I.E.E. North-Eastern Centre. Annual dinner and dance.

Saturday, 24th March

EDINBURGH. — The University. British Institution of Radio Engineers, Scottish Section. Symposium of papers on "Industrial Electronics in Scotland," including works visits.

Management Course

The University of Cambridge has arranged a fourth course for managers in industry. It will be held at Madingley Hall from 25th June to 21st July next, and will be open to managers who have had some years of industrial experience and who are under forty years of age. The secretary of the course is Mr. G. F. Hickson, Stuart House, Cambridge, from whom details can be obtained.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—23rd April. New South Wales Electricity Commission. Four 11 kV shunt reactors. (E.S.B. 5705/56. Ten/18316.)*

1st May. Director, Posts and Telegraphs, G.P.O., Melbourne. Carrier testing equipment. (E.S.B. 5377/56. Ten/18314.)*

8th May. Commonwealth of Australia, Australia House, London. Cordless type telephone switchboards. (E.S.B. 6106/56. Ten/18382.)*

30th May. State Electricity Commission of Victoria, Melbourne. Impulse generator and equipment. (E.S.B. 6195/56. Ten/18366.)*

Blackpool.—4th April. Borough Council. Street lighting equipment. (See this issue.)

Brazil.—10th April. State Electricity Commission. Equipment for a transformer substation at Guaiba. (E.S.B. 6043/56. Ten/18333.)*

Burma.—22nd March. Union Purchase Board. 8,000 battery plates and 5,000 separators. (E.S.B. 5858/56. Ten/18295.)*

Durham.—28th March. County Council. Electrical installation in Henry Smith Grammar School, Hartlepool. (See this issue.)

Egypt.—18th April. Ministry of Public Works. Two transformer substations for the Nile Hilton Hotel substation and the Helwan aircraft factory substation. (E.S.B. 5592/56. Ten/18281.)*

Felling.—28th March. U.D.C. Street lighting equipment. (See this issue.)

Formosa.—4th April. Central Trust of China. Switchgear and cables. (E.S.B. 6261/56/I.C.A. Ten/18374.)*

India.—31st March. Government of Mysore, Stores Purchase Committee. 22 kV porcelain bushings. (E.S.B. 5615/56. Ten/18275.)*

10th April. Government of Bihar, Electricity Department. Eight 3,000 kVA power transformers. (E.S.B. 6306/56. Ten/18358.)*

14th June. Kanpur Electricity Supply Administration. Air break type auxiliary switchgear. (E.S.B. 6305/55. Ten/18360.)*

Korea.—27th March. Government Office of Supply, Seoul. 600 V insulated cable and wire. (E.S.B. 5023/56/I.C.A. Ten/18240.)*

New Zealand.—25th April. Post and Telegraph Department, Wellington. 35,000 protectors and fuses and 3,000 arrestors. (E.S.B. 5506/56. Ten/18293.)* 26th April. Insulated cadmium-copper wire. (E.S.B. 5569/56. Ten/18317.)* 27th April. 6,000 terminal blocks. (E.S.B. 5952/56. Ten/18306.)*

Pakistan.—18th April. Government Department of Supply and Development. Plant and equipment including three 5,750 kVA turbo-alternators, transformers, cables, switchboards, etc., for Gujranwa'a Hydel power house. (E.S.B. 4280/56. Ten/18311.)*

Portuguese East Africa.—11th April. Ports, Railways and Transport Department, Lourenço Marques. 30 electric ventilators. (E.S.B. 6048/56. Ten/18331.)* 22nd May. 96 electric motors and 10 ammeters. (E.S.B. 6044/56. Ten/18325.)*

Rhodesia and Nyasaland.—23rd March. Federation of Rhodesia and Nyasaland. Polythene telephone cable. (E.S.B. 5983/56. Ten/18315.)*

3rd April. Federal Hydro-Electric Board. 750 MVA, 11 kV, 1,200 A and 2,500 A indoor airblast switchgear and ancillary equipment for controlling shunt compensator reactors. (See this issue.)

South Africa.—22nd March. Stores and Buying Branch, City of Johannesburg. Electric cable. (E.S.B. 6403/56. Ten/18355.)*

29th March. Union Tender and Supplies Board, Pretoria. Vacuum cleaner outfits. (E.S.B. 6455/56. Ten/18363.)* 5th April. Suspension insulators. (E.S.B. 6481/56. Ten/18376.)* Cable locators. (E.S.B. 6454/56. Ten/18365.)*

4th April. Stores Department, South African Railways. Twelve 10-50 kVA transformers. (E.S.B. 5739/56. Ten/18278.)* 5th April. Telegraph line material. (E.S.B. 5732/56. Ten/18305.)* Telephone cable. (E.S.B. 6484/56. Ten/18378.)* Electrical cable. (E.S.B. 6483/56. Ten/18377.)*

Southport.—Corporation Lighting Department. All types of electric lamps. (See this issue.)

United States.—27th March. Bureau of Reclamation. Six 115 kV power circuit-breakers for Glendo switchyard. (E.S.B. 5815/56. Ten/18341.)* 29th March. Two 69 kV circuit-breakers. (E.S.B. 6253/56. Ten/18362.)* Shunt capacitor equipment. (E.S.B. 6254/56. Ten/18371.)* 10th April. 3,750 kVA power transformer. (E.S.B. 6300/56. Ten/18380.)*

West Riding.—29th March. County Council. Street lighting equipment. (See this issue.)

Workington.—11th April. Street lighting equipment. (See this issue.)

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1. (Chancery 4411; extension 769).

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashington.—Fire station for Northumberland C.C.; county architect, County Hall, Newcastle-on-Tyne.

Ballycastle.—Assembly hall, classrooms, science block and dormitory, Cross and Passion College; J. J. Brennan, architect, 143, Royal Avenue, Belfast.

Bredbury and Romiley.—Civic hall and extensions to Council Offices (£75,000); T. Hodkinson, U.D.C. surveyor, Council Offices, George Lane, Bredbury, Ches.

Brighton.—Omnibus garage, Moulsecomb Way and Lewes Road; Southdown Motor Services, Ltd., 5, Steine Street.

Bristol.—Britannia Hotel on city outskirts; H. & G. Simonds, Ltd., The Brewery, Reading.

Bromborough.—Works; Michelin Tyre Co., Ltd., Boothen Estate, Stoke-on-Trent.

Chelmsford.—Laboratory block; Marconi's Wireless Telegraph Co., Ltd., New Street.

Chorley.—Office block in Yarrow Road; Downs Coulter & Co., Ltd., cotton manufacturers, Yarrow Mill.

Colchester.—Houses and flats (134) on sites at Shrub End, Barn Hall, King George Road and Monkwick; borough surveyor, 1, West Stockwell Street.

Crawley.—Technical college (£277,457) for West Sussex C.C.; James Longley & Co., Ltd., building contractors, Joinery Works, Crawley.

Croydon.—Typewriter factory in Gloucester Road; Ernest Bates & W. Sinning, architects, 8, Katherine Street.

Durham.—Carpet factory on the Dragonville Estate for Hugh Mackay and Co., Ltd., Durham.

Exeter.—Operating theatre (£40,000) at the Royal Devon & Exeter Hospital, with nurses' home and new area department of pathology at a later date; Administrative Headquarters, Exeter & Mid-Devon Hospital Management Committee, 26, Queen Street.

Felling (Co. Durham).—Special day school for Durham C.C. (£46,000); R. Matthews and Co., builders, Villiers Street, Sunderland.

London.—Dwellings (114), Abbey Street, Bermondsey; Clifford Culpin & Partners, architects, 39, Doughty Street, W.C.1.

Office block, Bolton Street, Piccadilly; Lewis Solomon, Son & Joseph, architects, 21, Bloomsbury Way, W.C.1.

Flats (60), Shoot Up Hill, Willesden; borough engineer.

Works extensions, Willesden; Mabie Todd & Co., Ltd., Whitby Avenue, N.W.10.

Neasden.—Works and offices, Falcon Industrial Estate; Chromoworks, Ltd., 416-24, High Road, N.W.10.

Newcastle-on-Tyne.—Rebuilding of factory, McClure & Co., Roman Avenue; C. S. Errington, 46, Granger Street.

Factory additions, Scotswood Road, for Michell Bearings, Ltd.; Fennell and Co., architects, Bridge End Chambers, Chester-le-Street

Flats (108) at Kenton North for the C.C.; Cussins, Ltd., contractors, The Drive, Gosforth.

Newport (Isle of Wight).—Works extensions; Saunders-Roe, Ltd., Forest Road.

Newport (Salop).—Engineering works; Audley Engineering Co., Ltd.

North Shields.—Fire station at Preston North Road; borough engineer, 16, Northumberland Square.

Northampton.—Reconstruction of premises (£300,000); Adnitt Bros., Ltd., The Drapery, Northampton.

Sedgley.—Works, Dormiston Estate, Upper Gornal; King's Norton Excavators, Ltd., 1, Beech Road, Birmingham, 30.

Southampton.—Hall of residence, for the University Authorities; Basil Spence & Partners, architects, 48, Queen Anne Street, London, W.1.

Stockport.—Police buildings in John Street, for Watch Committee; G. Bullimore, architect, Lloyds Bank Chambers, Great Underbank, Stockport.

Tynemouth.—Glass-making factories on 25 acre site; J. A. Jobling & Co., Ltd., Sunderland.

Walsall.—Factory; Church & Bramhall, Ltd., Reservoir Road, Pleck.

West Bromwich.—Works and offices, Bromford Lane; Steelwork (Frames), Ltd., 76, Halloway Head, Birmingham.

Westwood (Thanet).—Factory, Gordon Road; G. A. Harvey & Co. (London), Ltd., metal trade manufacturers, Woolwich Road, London, S.E.7.

Whitley Bay.—Houses (70) at Seaton Sluice; E. Roberts, borough engineer.

Wolverhampton.—Reconstruction of factory buildings (after demolition), Moorfield Road; Turner Manufacturing Co., Ltd., Wulfruna Works.

Factory, Walsall Street; Metal Handicraft Co., 17, Halletts Row.

Works extensions, Graisley Row, for S. J. & E. Fellows, Ltd., stampers, Vulcan Works; Bertram Butler & Co., architects, 6, Tettenhall Road.